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MENDING A BROKEN PROPELLER AT THE HYDE WINDLASS COMPANY'S PLANT, BATH, ME.

By W. R. Dean.

What was probably one of the most remarkable feats of burning or welding together two castings out of non-ferrous alloys was performed at the foundry of The Hyde Windless Company's plant, Bath, Me., about five years ago, and a similar feat repeated last spring. A steamer, plying in the West India trade, with a composition propeller ran on a rock and broke off the ends of all four blades, and having an economical captain, started up the Atlantic coast to get them mended or new end burnt on without going to the expense of having a new propeller. The captain tried all along the coast and was told that it could not be done. He put into the city of ships for repairs to the vessel, and at the Hyde Windlass Company was told that they would try it. This they did with perfect success, and the wheel is still in use on another vessel, a new steamer having been built for the company.

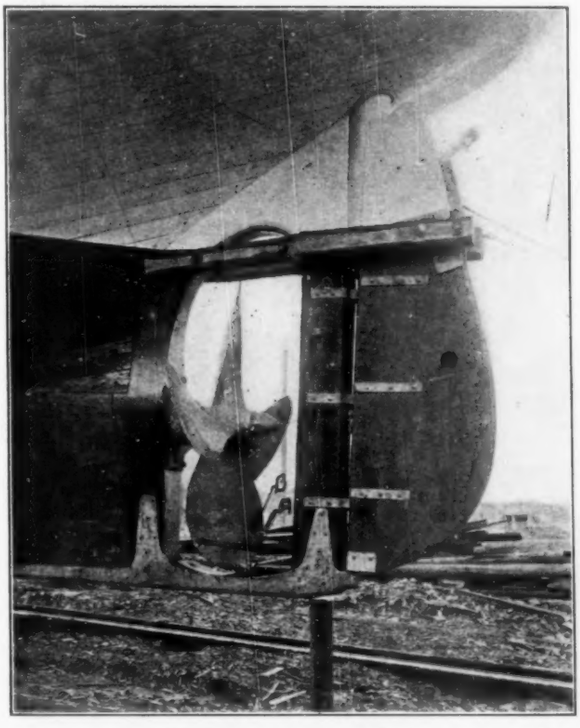


FIG. 1. A PROPELLER WHEEL MENDED FIVE YEARS AGO STILL IN USE.

Fig. 1 shows the wheel on the new steamer. The welded place is at A, while B is where they stopped grinding when smoothing up after the burn.

All castings shown in the photograph are of Hyde's Manganese bronze, with the exception of the propeller. This is composition and the ends burnt on are of composition.

Last spring the company did a similar feat on a Parsons' Manganese bronze wheel, burning on one end—the end being Hyde's Manganese bronze. Fig. 2 shows the propeller with the bent end drilled off. The end was so bent and cracked that it could not be straightened, so was drilled off, and I will try and describe the process of mending it as done at the above plant.

A template was made from a good blade and from this template was made a pattern for an end to correspond to the end drilled off. Fig. 3 shows (A-A) the casting of this end. B is the riser to keep the end from shrinking when the casting was made. C-C shows the line of joint between the wheel and the end. This casting A-A is lined up with the rest of the blade on the template D, this being the template used to make the pattern for the end. Under C-C is placed a strip of sheet tin directly against the castings, this strip is about 4 ins. wide. Sand is tucked good and hard up under this, and the holes left by the drilling are filled in with bronze and allowed to set. It is easier to melt the two together if there are no large holes to fill first, as the metal will not melt when it has to strike the sides first. After this metal has set the mold is ready to go ahead with for the final operation.

FIG. 2. A WHEEL WITH END SO BENT AND CRACKED THAT IT HAD TO BE DRILLED OFF.

The space to be filled for the burn should be about 3 inches wide and 5 inches deep. Fig. 6 shows the space filled. A piece of wood conforming to the curvature of the

blade and having the above dimensions is placed over the joint and sand rammed up all around it and troughs

FIG. 3. PREPARING TO "CAST ON" THE DRILLED OFF END.

made for the overflow. Fig. 4 shows the metal running into the overflow. Now, when this is all done, the space

FIG. 4. POURING THE END.

to be melted together has to be heated with a blow-torch and kept hot until the metal is ready. The ladle must be hot and the metal hot. When everything is good

FIG. 5 EXAMINING THE "CAST ON" END.

and hot and the bronze smoking hot the burn can be made. Fig. 4 shows the burn being made under the personal supervision of the foundry superintendent, a man who has made this foundry famous for the quality of its castings, both iron and bronze. The photo shows how hot the metal was, as the ladle cannot be seen on account of the smoke. I had to take a time picture and

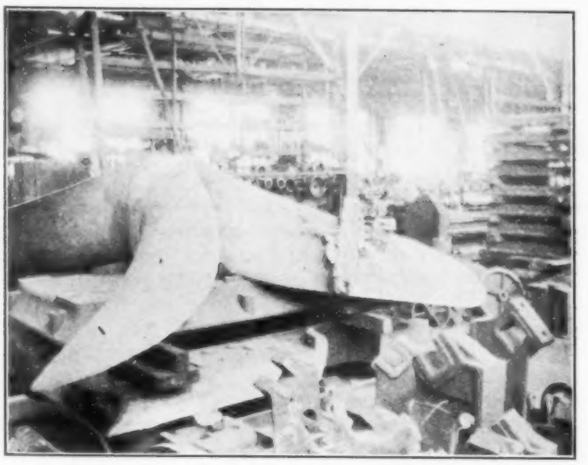


FIG. 6. SHOWING THE SPACE FILLED IN

every one was on the move, hence the blur of the superintendent. The ladle was being constantly moved so as to let the metal hit in all parts of the space.

The superintendent was feeling the space with a small bent rod so as to know when the hot metal met the ends. About a ton of metal was melted, but as the burn took quickly only a small part was used—about 800 pounds. The castings were good and hot, otherwise it would have taken more. Fig. 5 shows the burn all made and the foundry superintendent trying it in different places to see that it is all right. The ingots from the

FIG. 7. THE MENDED WHEEL.

overflow can be seen in the foreground. After they were done pouring the ends, where the metal overflowed, were stopped up so as to keep in the last of the metal and give a header to the part.

Fig. 6 shows the wheel in the machine shop ready to have the risers drilled off. After these were drilled off the blade was ground with a flexible shaft grinder, and it was impossible to see where the burn was, the two pieces were melted together so thoroughly. The blade was ground back beyond the burn and the wheel finished and ready to ship as shown in Fig. 7.

SCIENTIFIC MANAGEMENT IN THE MANUFACTURE OF PLUMBING, STEAM, GAS AND WATER WORKS BRASS GOODS.

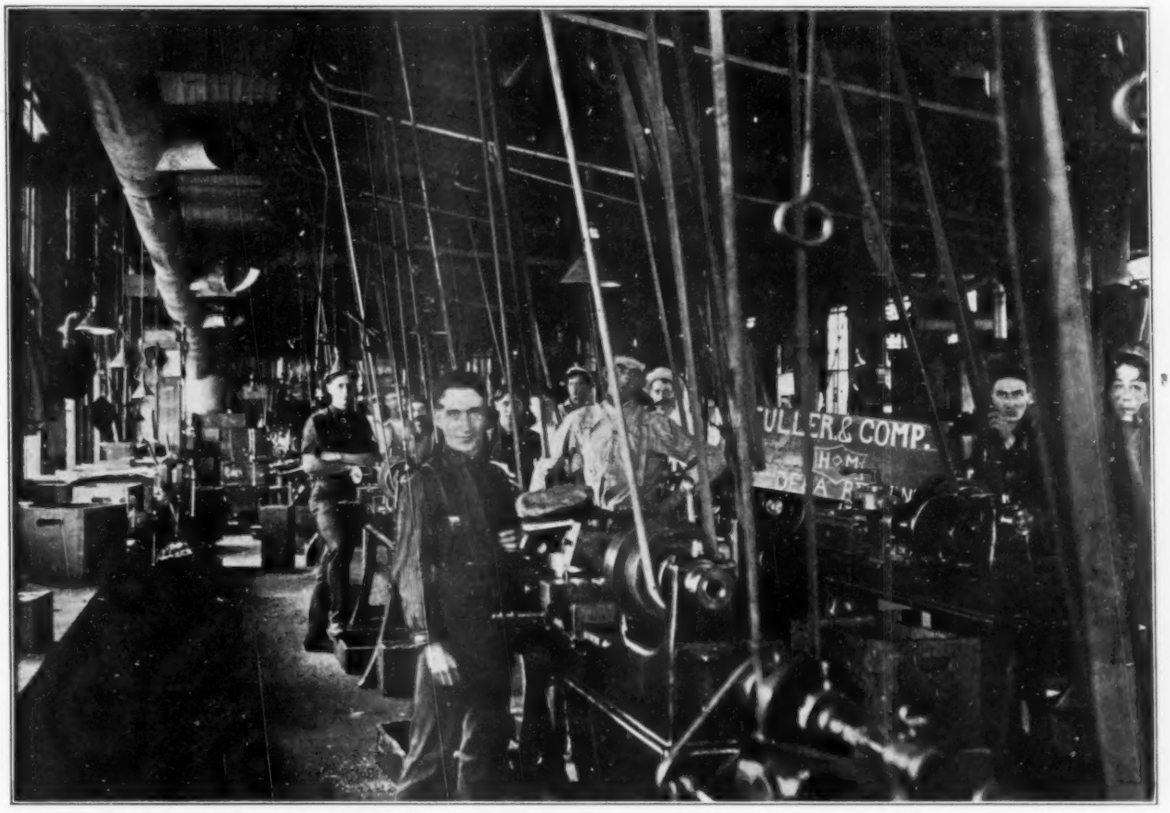
By P. W. Blair.*

There are three plans of manufacturing brass goods, the unsystematized or "hit or miss," the systematized or "know-where-you-stand," and the scientific management or "know-how-to-get-there-the-best-way." Personality is vital to the successful working of each, and in this article I will show where scientific management can be applied in the producing of goods and obtain results. The great competition introduced by improved machinery and the application of the principle of the subdivision of labor renders it continually necessary for each manufacturer to be on the watch, to discover improved methods by which the cost of each article can be reduced and quality of goods maintained, and it is of great importance to know the precise expense of every process. To introduce scientific management is first necessary. A man with a file and a true plane surface can supply a duplicate of that plane surface if he has sufficient skill and works long enough, but he will produce the same result more quickly and accurately if he has a machine tool of the highest class to aid him. And in proportion to the accuracy of the machine tool, so will be the ease and speed of the performance. A modern system or organization is a high class machine tool. It can be done without, but not economically. That is all there is to it. The wise man will make his own choice.

PETER W. BLAIR.

The best way to determine the results from any machine is to know before you commence about what should be expected and have your foreman explicitly instruct the operator the amount he is supposed to turn out of that article for a day's work. Here is the machine, and there is the man; we expect so many pieces per day from this machine and it is up to you to obtain the results. If he fails to meet your requirements in this respect have the right man at the head of your institution discover where the trouble lies. The problem of management is to secure the best results of the whole body by securing at once the efficiency of each individual and the working together of all the individuals with each other in harmony. Some born managers have the power to drive, and others have the power to lead. As an example take a section foreman of a railroad, a man is chosen because he is a good driver, he walks around and sees that they work with their picks and shovels and make the dirt fly as quickly as they know how.

In a force of workers who are of a higher type mentally on the other hand, as for example in a brass manu-



SCIENTIFIC MANAGEMENT IN A BRASS WORKING SHOP.

*Foreman Brass Finishing Department, H. Mueller Manufacturing Company, Decatur, Ill.

facturing plant, the foreman who while exercising authority also encourages the men to make suggestions and try to improve on the methods of doing work or improve the quality or appearance of the goods and spreads among the workers a spirit of co-operation and not dissatisfaction or friction is unusually successful and able to get good results. Under scientific management in the manufacture of brass goods a shop should be equipped with a designing and planning department where all goods that are manufactured shall be determined how they are to be made and equipment to be used in the manufacture of same. Also the quantities or amounts of these goods that can be sold per month which will allow for the expense of making special tools or machines to produce the amount. When designing tools for new work, simplicity and strength for wear should be the first thought. Tools should be inserted that are easily replaced, rather than make a tool from a large piece of steel with an immense amount of work and waste of material have the design such that there is no finish required, keeping in mind at all times that replacements will be necessary some day, and this is where simplicity has to be seriously considered in designing new tools.

A practical and experienced brass worker should have a desk in the planning department for the select-

A 4½-INCH FULLER BATH COCK.

ing of tools to apply on every piece of new goods to be manufactured. He should also have expert knowledge and records of all tools in tool storage department and experience in the use of same. Scientific management thus necessarily involves the selection of the workmen.

It may be evident that scientific management consists in something more than the scientific study of operations and the establishment of a planning department and laying out the method of work from the old system. Something must be done to make it apparent to the workers that it is to their interest to acquiesce in the change from the old system. It must be an assurance in a tangible and permanent form presented fairly to each worker that the increased production entitled him to a share of same. This assurance should be given by a stipulation that a bonus shall be received by every worker who attains a definitely set standard.

For example, a 4½ Fuller bath cock, with its many parts, can be taken each part individually and a standard set on each part. A bonus is set for producing above this standard in addition to the regular wage or salary after the goods have passed inspection. If the workman fails to earn a bonus there must be a definitely ascertainable reason for it. If it is the fault or defect of the worker the foreman is at once as interested as the worker to see that the fault or defect is remedied. If it exists elsewhere both are interested to see that the reason is discovered. If the preliminary study on which the standard is based has been properly done there is in addition to the bonus, a reward in greater ease of work and release from distraction and confusion. It thus appears that through scientific management greater profits are secured through an increase of wages.

In the majority of brass manufacturing plants piece work is the rule. The worker receives so much per hundred he turns out on the machine or bench. It usually results in dissatisfaction and inferior workmanship on goods, and an ultimate reduction in wages since the pacemaker tends to set the standard for a day's work and everybody else finds that at the end of a day he has fallen behind and has not made a day's wages. I cannot expect within the limits of this article to indicate all that is involved in scientific management in the manufacture of brass goods. I hope that I have made it clear that scientific management is not the adoption of certain devices, such as the bonus for special piece work; that it is not mere systematization; but that it is the acceptance of certain fundamental principles. It is a form of co-operation practically applied.

As an illustration that has come under the writer's own personal observation of what scientific management will do for the production of brass goods and quick service. A manufacturing company in the middle west recently received an order in round numbers to $5,500 from the Water Department of Seattle, Washington. The goods on this order were made from special patterns. The order was received on the 3rd of the month and was shipped complete on the 14th of the month, which was only eleven days. Another order amounting to $15,250 was received from the Los Angeles, California, Water Department on the 4th of the month and was shipped complete in a special car on the 22nd, eighteen days.

As I have shown you scientific management cannot be bought and delivered in a box, but when it is installed it will bring results that cannot be achieved by a merely born manager. From what I have said I hope it is clear that scientific management involves the acceptance of the following principles:

First, the planning department with its varied functions assigned to different agents, should be in full control of every part of the organism, determining exactly and ordering by means of drafted directions not only what the product shall be, but how the processes shall be carried on.

Second, to this end, the planning department shall adhere to and decide in the common enterprise including in these elements not only things and their properties but also men and their ways.

Third, they must abandon the practice of classifying men according to labels they wear and instead must proceed scientifically in the selection of the workers and in the assignment of them to their tasks.

Fourth, the planning department must adopt such a system of distribution responsibility and compensation as will make authority coincident with knowledge and apportion reward according to service rendered.

Whatever management is based on these four principles may fairly be called scientific. It is of minor consequences what devices or what system it adopts to make those principles effective.

CHINESE INSECT WAX.

Chinese Insect Wax. Melts at 179.6 to 186.8 degrees Fahr., and has a translucent white color.

POLISHING WHEELS, THEIR CONSTRUCTION, USE, CARE AND ABUSE*

THE THIRD PAPER OF A SERIES DESCRIBING THE VARIOUS TYPES OF POLISHING WHEELS.

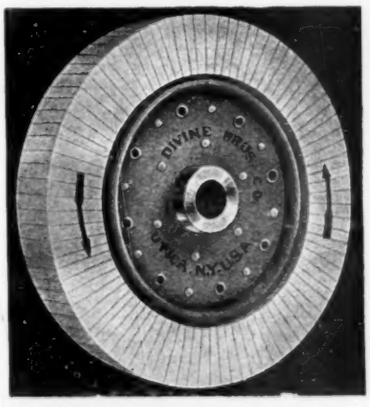
BY T. C. EICHSTAEDT.†

(Continued from August.)

THE COMPRESS FELT AND CANVAS WHEELS.

The compress felt wheel is made up of blocks or sections of felt, cut out of sheet and set into circles, similar to the compress leather wheel, compressed into the required circular size, and set into steel disks with a cast-iron hub or center. These wheels are used quite extensively for finishing, are set up in emery and can be obtained in any width and diameter. They are made with 1-, 2- or 3-in. cushion, which is the part of felt that extends outside of the iron or steel disks. They can be cut into almost any shape for doing different classes of work, such as knobs, knife and fork handles or cut into grooves for screw and bolt heads, and should be run perfectly smooth and true. If extreme care is exercised in the use of these wheels they will prove very economical wheels. They should be used simply for finishing or fining down and not as a roughing wheel.

To clean off on a felt wheel the following directions should be followed and it will prove a great saving in material, as felt is very easily wasted in cleaning off wheels for resetting or recovering with emery: When it



COMPRESS FELT WHEEL.

is necessary to clean one off, and this is necessary only when the surface of the wheel is either worn through into the felt or the emery is broken out in places on the surface, take a bucket of warm water and set it directly under the front of the wheel so that the drippings of the wet waste can drop into the bucket. Now soak a piece of waste in this water, using a piece of pumice stone in conjunction with the waste; first applying the pumice to the surface of the wheel while it is in motion to clean the grease off the surface of the wheel. Then hold the wet waste against the wheel, using it very wet, and hold the pumice directly under the waste, using one hand to hold the waste and the other to hold the pumice. Keep this up until all the emery and glue are cleaned off the surface of the wheel. In applying the waste water and pumice judgment must be used as to the amount of pressure needed, but the soaking is most essential as the warm water dissolves the glue and the pumice stone or brick cuts it off. After the emery and glue are all removed from the wheel, use a piece of clean waste and soak it in the warm water and apply it to the wheel without any pumice until you have a clean felt surface and then use a piece of coarse sandpaper, applying it with very little pressure to the wheel, assuring a clean surface for the glue which should be applied to the wheel. Use the glue as thin as possible and also apply it directly to the surface of the wheel as quickly as possible while it is yet on the spindle, but not in motion. When the glue has been applied start the spindle slowly; do not throw on the belt full force, but put it on by degrees, or if you are using a motor, start it slowly. After the spindle has made a few revolutions the surplus glue will fly off leaving a very thin film of glue. By the time you have cleaned up around the wheel it will have dried sufficiently to use a piece of coarse sandpaper to smooth down the glue on the surface, the wheel still being on the spindle and revolving. Press lightly on the sandpaper so as not to cut through the glue into the felt. Finally take off the wheel and recover it with the required size of emery and hang it up or lay it down to dry in a moderately warm place; when it is dry it is ready again for use.

In using these wheels I have found that they seem quite hard at first, but they should not be pounded to make them soft; a felt wheel cannot be softened by

SOLID FELT WHEEL.

pounding. Use a little judgment and do not hold the article in hand too long against the wheel nor use too much pressure, but change the position of the material so that the wheel will not get hot, which will cause the glue to blister and the emery will fly off of the surface in blisters. This spoils the setting of emery and the wheel must be cleaned off at once in the foregoing manner. Another good way and the most economical way to clean a wheel, either felt, canvas, bullneck, or in fact any wheel used as a polishing wheel, is to use gasoline. Great care must be exercised not to cause a fire. This is a very quick process, as it does not cut away any of the surface of the wheel, nor does the wheel need any sizing after this process of cleaning. The process is as follows:

First, see that no one along the line is roughing out or grinding any steel work, for this throws quite a spark of fire into the blower and may ignite the gasoline and cause a fire in the blower pipe. All danger of fire may be avoided by closing the blower intake at the place where the wheel is to be cleaned. There should also be a good circulation of air in the room where the gasoline is to be used. Stop your wheel and scrub vigorously the surface with gasoline, using a brush such as platers use for scrubbing. Then start the wheel revolving fast and

*The first paper appeared in February, 1911.
†Expert Polisher.

hold against it a clean piece of waste that has been saturated with the gasoline. In a minute or two you will have a perfectly clean surface on your wheel. True, emery and glue will not be removed, but you can safely apply a coat of glue and emery directly to this surface. Neither this process nor the one described above should take more than five minutes' time. There is still in

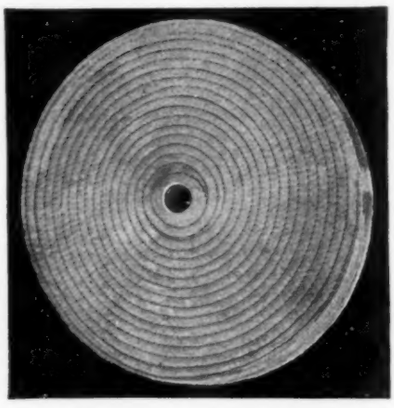
WOOL FELT WHEEL.

vogue the old common process of cleaning off all kinds of wheels, but it is very extravagant in waste of material and time. This process has been in use ever since I can remember and is accomplished in this way: Use a piece of solid emery to clean off the glue and emery wheels, and then a buff stick, set up in No. 20 or 30 grit and which weighs nearly fifty pounds, is used, which cuts into the material at an awful rate of speed, and when a man does not have it completely under control so that he knows just what pressure to put against the wheel, he will waste more felt, canvas or leather than one can imagine. As felt or leather wheels are high in cost care should be exercised especially in cleaning them.

The compress felt wheel is not used nearly as much as the solid felt, for which many different reasons are advanced. But where one has much work to do on felt

CANVAS SOLID CEMENTED OR GLUED WHEEL.

wheels I believe the compressed is more economical than the solid. In the first place there is the cast center in the compress felt wheel, and when a wide wheel is needed to cover a given surface, it is better than a solid felt. For if a solid felt wheel gets out of balance when first put on a spindle to turn it down, it will take a man from one to two hours to turn down and true up for use. And he will continue to have this trouble every time he cleans this wheel off or almost every time he wants to use the wheel. Experienced polishers know this to be so and there seems to be no getting it into shape until the wheel is too small for the purpose for which it was intended. Furthermore it does not take long to cut off a pound of felt from a wheel that has to be balanced continually and cutting down, and felt costs money. A felt wheel can be properly set up in about ten minutes' time if the center



COMPRESSED MUSLIN WHEEL.

hole fits the spindle and it has been balanced true. One does not have as much cushion in a compress felt wheel as in a solid felt. One can get out of them all that is needed for any kind of work.

Another good quality in the compress felt wheel is that one can keep a corner on it better than on a solid felt wheel. In using any kind of a felt wheel it is absolutely necessary to have the surface of the wheel run smoothly and true in order to do the best work and save the wheel from being abused; also it must be perfectly balanced and dry before using it. Felt wheels should not be used for any purpose in a polishing room, but only for finishing, as canvas and cloth wheels are cheaper and better adapted to the roughing and fining down operations. There is now a still cheaper wheel on the market, one that is more economical than the felt wheel for finishing

COMPRESS CANVAS WHEEL.

purposes. The time will come when felt wheels will only be used for buffing high light work and the compress felt wheel is the most economical for this purpose. I know of a stove factory that is a little behind the times which uses an enormous lot of felt wheels for buffing. They use them in 14-inch sizes and only use about 4 inches off of them and discard the 10-inch center. If they used compress felt wheels they would not have near the waste and could return the disks and centers to the wheel

factory and have them refilled with felt. Again, the compress felt wheel will not wear away as quickly as the solid felt.

THE COMPRESS CANVAS WHEEL.

This is a very good economical wheel and is made in soft, medium and hard grades and is an excellent wheel for roughing out and fining down and finishing operations, especially for any kind of work not having a flat surface, although there are many of them in use even for flat surface work. It is surprising how much flat surface work is now being polished on these wheels. When I look back quite a few years and see the difference in the polishing then and now, and note the progress that has been made in the trade, and then look at some of the other trades, I do not see that there has been as much progress as there should have been, which is due to the fact that the polishers themselves are so slow to take up with anything new. The compress canvas wheel is the most economical canvas wheel that I know of. It is made like the compress leather and felt wheels, the canvas being cut out into pieces by a press and put into a band, pieces set crosswise and pressed into the desired circle

CANVAS. HAND SEWED OR QUILTED WHEEL.

size and then set into steel disks with cast-iron center or hub. They can be used for almost any kind of work having an irregular surface, as the wheel will give to the irregularities of the surface, especially for round surfaces, such as handlebars for bicycles, auto levers, lamp brackets and cranks.

They can be cleaned off in the same way as described in the foregoing process for canvas and felt wheels. I have used the compress canvas hard wheel for finishing, cleaning them off as described with gasoline and they proved to be very economical. They differ from the one-piece or solid canvas wheels in that the canvas is put in crosswise while in the solid the wheel is made up of layers of canvas glued or cemented together. They are also made in 1-, 2- and 3-inch cushions and will last as long as any of the solid canvas wheels and with proper care will outlive them. They are also most economical in the use of emery and glue, as the cutting quality of the emery seems to last longer. These wheels last longer and are easier to take care of than the solid canvas wheels because they have the cast center and are therefore easier to keep true and run better and are not so apt to come apart as solid canvas wheels; in fact, after they have been used for a while it is practically impossible for them to come apart. These wheels as well as other wheels should not be pounded. If they are too hard use a file or a piece of pipe as described above in softening the compress felt wheel. The compress canvas wheel can also be cut into shape to suit such work as knobs, bolts or screw heads, but I do not recommend them for this purpose, as the leather or felt wheels are better for such work since the canvas wheel is not stiff enough to stand up on the edges. It is a wheel to be used either with a flat or oval face to get the best work out of it.

Should anyone reading these articles see anything that does not meet with their approval, and if they can prove that I am wrong in any statement that I have made I will be pleased to have them correct the same, either through the columns of this paper or by personal correspondence. I rather invite criticism, as that is education for the many who read THE METAL INDUSTRY. I have now pretty well covered the wooden and compressed wheels and merely wish to state that after the wooden wheel the compressed comes next for all-around work, where quality of work is desired. They are the most expensive wheels on the market so far as first cost is concerned and that is the principal reason that there are not more of them in use. Then again when they are put into a room where there is no one who understands the handling of them they are soon condemned, simply because the men worked piece work and could not take the time to become acquainted with the use of the improved equipment, and the foreman had not the stuff in him to show the men how to use it or else was indifferent. Polishers, as a whole, do not care for any improvements in the trade except that they do not have to do any more pieces of work than they are doing at present. I regret to say it, but such is the condition in the publishing trade, and that is the reason the trade is not advancing as rapidly as it should.

(To be continued.)

PLATES FOR MUSIC ENGRAVING.

[FROM UNITED STATES CONSUL-GENERAL JOHN T. GRIFFITHS, LONDON.]

In England ordinary sheet music is produced by the lithographic process. The stones used are imported from Germany and France, the latter stone being of superior quality, of a grayish color, and costing about 6 cents per pound, whereas the German stone is of a bath-brick color and sells for 1½ to 3 cents per pound. A stone measuring 20 by 30 inches usually weighs about 80 pounds.

The cheaper grades of music, of which there is a considerable output, are printed from zinc plates by the photomechanical process. The average cost ranges from $144 to $146 per sheet-ton. The title-pages are often reproduced from plates made of spelter, the present prices of which range from $113 to $114 per ton (2,240 pounds).

The production of britannia metal was formerly an important industry at Birmingham and Sheffield. It was used especially in the manufacture of coffee and tea services and to a limited extent in the production of spoons and forks, but is not used for music plates. The proper composition of a good quality of britannia metal is 90 per cent. tin, 8 per cent. antimony, and 2 per cent. copper, and when tin sold at $300 to $350 per ton the metal was cheap and filled the place now occupied by German silver. Since, however, the price of tin has risen to $950 or more per ton the value of britannia metal has so increased that it is more economical to use German silver, though the cost of the manufacture of German silver is much higher. As an industry it may be said that the manufacture of britannia metal has practically died out. It is still used to some extent for the manufacture of hot-water jugs, coffee and tea pots, sugar basins, soup tureens, dish covers, soap boxes, etc. [See also report on music plates in THE METAL INDUSTRY, June, 1911.]

THE CAUSE AND PREVENTION OF PITTED AND ROUGH NICKEL DEPOSITS.

By Emanuel Blassett, Jr.

The pitting of nickel deposits while much less prevalent at the present time than in former years is still occasionally the course of much concern to many platers. The writer has never seen an adequate explanation of the phenomenon in any of the text books on plating and it will not be considered amiss to discuss this troublesome feature more fully. The pitting of nickel deposits is due to the occluded hydrogen gas forming minute blisters within the deposit or the hydrogen bubble may remain attached to the work while the metal deposits around them. It is generally recognized that pitting occurs when the solution is low in metal and the current is depositing hydrogen in a greater proportion than when the solution contains the required metallic content. This condition is very often brought about by adding an alkali to the bath, such as ammonia or some of the sodium compounds. It is a time honored fallacy with some platers to add an alkali to the bath when a little more hydrogen than usual is evolved from the cathode. When hydrogen is evolved more freely it indicates that the solution is low in metal, regardless of what the hydrometer may indicate in degrees. When the solution has been diluted with water, or the metallic content is reduced by precipitating the metal with some alkali, more of the current will be carried by hydrogen ions and therefore depositing more hydrogen upon the work.

Some platers assume that the evolution of hydrogen

A METALLIZED ELK.

The bronze elk shown in the illustration is the latest creation of L. G. Delamothe, the metallizer of Oakland, Calif. The elk, which will be placed in the Elk's Cemetery at Oakland is nine feet long, six feet high (body size), and consists of a bronze coating over the sculptor's cast. The legs are solid bronze castings. By making a statue by this method, cast bronze legs and metallized body, it is, of course, less expensive than an all cast statue. Standing beside the elk are the sculptor, N. P. Anno, and the plater, L. G. Delamothe. Mr. Delamothe was one of the pioneers in metallizing non-metallic substances, such as flowers, insects, animals, etc. He introduced the flower hat pins, which were so popular a few years ago. Recently he metallized a bust of General Fremont for the Fremont School of California, and is continually engaged in metallizing objects of the nature mentioned. Some other recent work of his have been the flowers and leaves raised by Luther Burbank, the noted horticulturist. Mr. Delamothe looks forward to doing an extensive business in metallizing at his Oakland shop.

indicates the formation of free acid, presumably sulphuric acid, and recommend the addition of an alkali to the bath. Such practice will only aggravate conditions as all alkalies must necessarily precipitate some of the metal. For instance, if ammonia (NH_4OH) is added it will form nickelous hydroxide $Ni(OH)_2$ as per the equation $NiSO_4 + 2NH_4OH = Ni(OH)_2 + (NH_4)_2SO_4$ increasing the ammonium sulphate and decreasing the metallic content of the bath.

The evolution of hydrogen does not indicate the formation of free acid. The test with red conge paper never shows that free acid is formed under normal conditions. On the other hand, a few drops of sulphuric acid added to a quart of solution will be sufficient to turn red conge paper blue. If the solution is managed properly there should be no occasion to add an acid or alkali. The remedy for pitting is to reduce the current temporarily and to add the double nickel salts with a little of the single salts if desired and particularly to keep all alkalies from the bath.

Thomas Edison recently obtained a patent (U. S. patent 964,096, 1910) on method of preventing the formation of the hydrogen bubbles on the cathode. It consists of introducing chlorine gas into the bath which combines with the liberated hydrogen forming hydrochloric acid. While it is not believed that this method is desirable in commercial nickel plating it emphasizes the necessity of keeping nickel deposits as free from hydrogen as possible. Edison states in his patent: "I find that the occlusion of hydrogen tends to make the deposit somewhat brittle and more or less porous." Another method employed in the Edison factories to remove the hydrogen gas from deposited nickel is to place the plated article in a muffle furnace and introducing a current of hydrogen gas. A red heat is employed and in this manner all the hydrogen is expelled rendering the deposit more soft and pliable and less liable to part from the plated surface. If the article is heated in the air, oxidiation would take place and it has been found that when heated with hydrogen in the manner described the desired results are obtained. Some of the parts of the new Edison storage battery, which are given a very heavy deposit of nickel, are treated in this manner. They are also kept in motion while being plated, thus allowing the use of a greater current density and minimizing the occlusion of hydrogen.

Pitting should not be confused with the rough, sandy deposits that are sometimes produced. Rough deposits occur when the solution has been violently agitated and the sediment allowed to settle on the work. More often they occur when the solution is low in metal and plating too much from the anode, especially when a strong current is employed. To avoid this trouble the current should be reduced or the solution replenished or both.

NON-FERROUS METALS IN RAILWAY WORK.

A Classic Article Giving a Description of the Application of the Metals in Railroad Equipment.*

By George Hughes, Inst. C. E., M. I. Mech. E.†

(Continued from October.)

Table III records a day's run of a tilting furnace at Horwich. The coke used was of an average Durham quality, having the following composition:

	Per Cent.
Carbon	89.24
Sulphur	0.86
Ash	9.35
Moisture	0.55
	100.00

BRASS-FOUNDRY SHOT AND SWEEPINGS.

All fettler's dust, moulder's spent sand, furnace ashes and slag, are systematically collected and riddled through a ½-inch riddle to collect coke and clean shot-metal, which is separated. Shot-metal and slag or clinker is sent to the pug mill and crushed wet, the recovered shot-metal being stored separately for disposal, whilst the powdered slag, etc., settles and is collected in a water-tank for subsequent sale. The spent sand containing metal particles is also passed through a riddle to collect the larger shot and afterwards washed in warm water in a hair sieve, thereby collecting every particle of metal, whilst the sand and any oxide dust is likewise washed off and collected for disposal, thus no particle of sand, scale or dust is thrown away by this procedure.

Table 114. Sample Day's Work on Melting in a Tilting Furnace, 29th November, 1910.
Day dry and bright. Fuel used, Durham coke.

No.	Heat. Kind.	Time. Start.	Time. Finish.	Ammeter Reading.	Blast Inches H_2O.	Details of Charge. Ing. Cu.	Pb.	Sn.	Zn.	Me.	Scrap.	P.Cu	Charge. Cwt.	qr.	lb.	Yield. Cwt.	qr.	lb.	Per Cent. Loss on each Heat.	Coke use Cwt.	qr.	lb.	Remarks.
																				0	2	2	Coke used for starting.
1	Gun metal....	6.30	7.30	1.6	2½	352	..	40	8	...	...	..	3	2	8	3	2	3¼	1.06	0	2	9	
2	Slide valve....	8 a. m.	9.15	1.6	2¾	160	10	20	..	48	200	10	4	0	0	3	3	24	0.90	0	2	9	Scrap = old slide valves.
3	Injector metal	10.0	11.15	1.6	2¾	164	5	20½	10½	250½ (special)	...	..	4	0	2½	3	3	27	0.77	0	2	9	
4	Brazing metal.	11.30	12.25	1.6	2¾	...	..	..	2	448½	...	..	4	0	2½	3	3	17½	2.88	0	2	9	
5	Copper	1.10	2.15	1.6	3	345	..	..	5	...	...	..	3	0	14	3	0	11	0.85	0	2	9	For tube-hole bushes and plugs.
6	Injector metal	2.45	4.15	1.6	3	164	5	20½	10½	248	...	..	4	0	0	3	3	24	0.90	0	2	9	
		7 hours = 2.8 H. P. hours.											22	2	27	22	1	23¼	7.36	4	0	0	=19.69 lbs. of coke per cwt. of metal melted.

*From a paper read at Autumn Meeting, Institute of Metals, New Castle-on-Tyne, England, September 20-22, 1911.
†Chief Mechanical Engineer, Lancashire and Yorkshire Railway.

SLIDE VALVES.

Slide valves are made to the following composition:

	Per Cent.	
Copper	84.5	
Tin	10.0	
Lead	5.0	
Phosphorus	0.5	(added as 15 per cent. phosphor copper).

Tensile tests taken normally and at temperatures up to 400 degs. F. do not indicate any particular loss in the strength of this alloy at these temperatures, as compared with the old state.

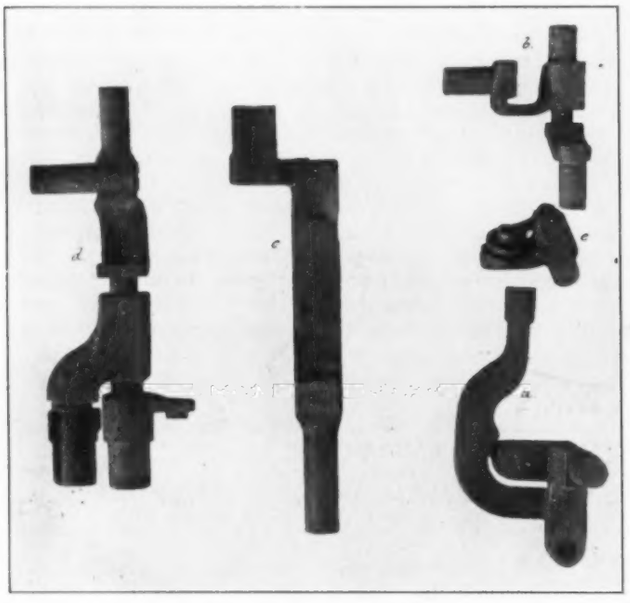


FIG. 7. CORES FOR INJECTORS.

Other mixtures containing as much as 13 per cent. lead have been used with fair results, whilst gun-metal valves of an alloy of 86 per cent. copper, 12 per cent. tin, 2 per cent. zinc, and therefore containing no lead, have not justified expectations under comparative tests in service.

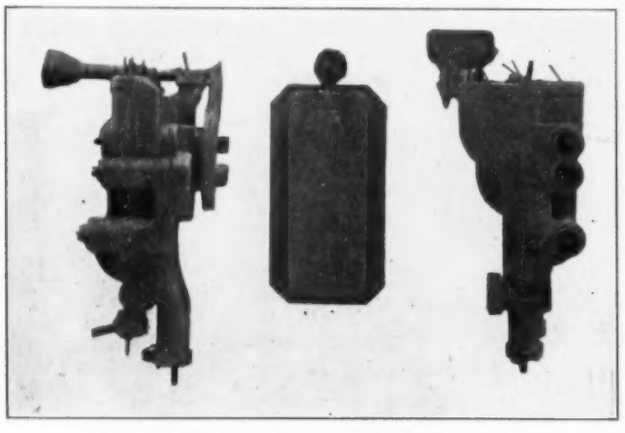


FIG. 8. UNFINISHED INJECTOR CASTINGS.

The mixture used is made from half old worn-down valves and half new metal, the copper being obtained from clean scrap-plate shearings cut from old firebox plates. These plates are bought to specification containing arsenic, 0.35 to 0.5 per cent., with other elements (exclusive of combined oxygen), not over 0.25 per cent. This mixture was adopted after trials to find the best wearing properties both of the valve and the cast iron cylinder port faces. Such valves of varying designs, from the simple "D" valves to the balanced types, have given satisfaction, working under temperatures of from 450 degs. F. to 600 degs. F., in the steam chests. They do not fracture in service, and an unbalanced "D" slide valve 7/8 inch thick will run 1,000 miles with a wear of 0.035 inch on the face. The wear of the balanced valves is not so much as this, careful measurements showing (in the case of valves working in a vertical position, known as Back-to-Back Balanced Valves) a wear of 0.0055 inch per 1,000 miles run. These valves are allowed to wear down 5/8 inch for both valves, the total mileage being 114,266.

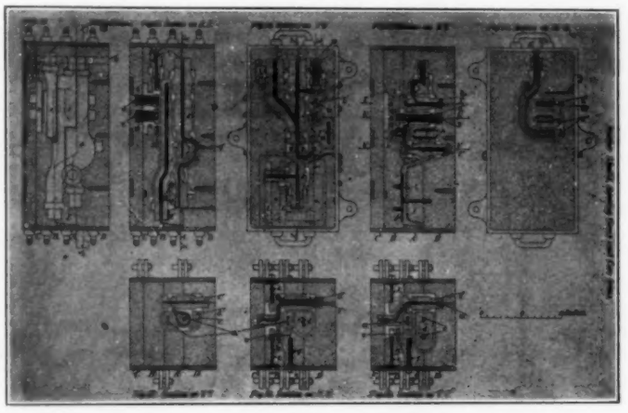


FIG. 9. INJECTOR MOLD, CORES AND CORE IRONS.

Modern conditions of superheat have caused the question of valves to come again under revision. The author has pleasure in stating that he has had running for two years a pair of ordinary slide valves at a temperature of 600 degs. F., with only a wear of 0.013 inch per 1,000 miles. He has also just turned twenty engines into traffic with a modified form of slide valve for superheat. In the strict sense of the term these are slide valves, and, so far, have given good results. Slide valves are molded in sand from plate patterns. Considerable care has to be exercised in molding, rapping, and drawing the patterns, as the valves when cast must pass limit gauges of 1/16-inch margin before going to the machine shop for grinding the face and to fit the buckles.

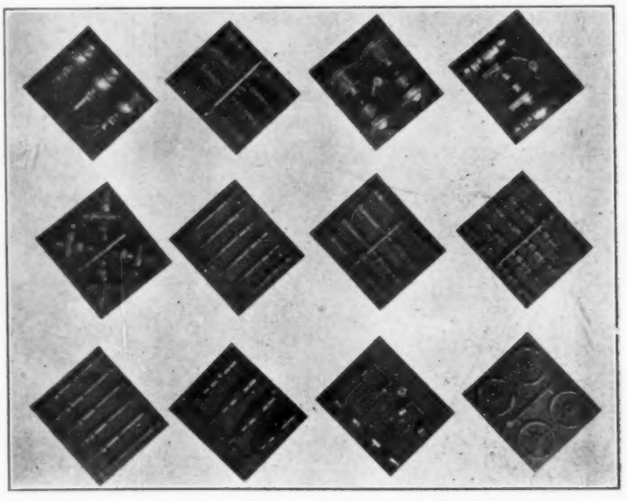


FIG. 10. PLATE PATTERNS FOR METAL CASTINGS.

GUN-METAL.

This is made to the well-known Admiralty specification:

Copper, 88; Tin, 10; Zinc, 2.

Certain work, such as valve seatings, bushes, steam regulator slides, and some slide valves, are cast in this metal, though other less expensive alloys containing lead are used for bearing brasses.

The alloy casts clean and sound into green sand or skin-dried molds, and should some of the constituent metals or scrap used be coated with scale entailing a tendency to oxidation, a small piece of phosphor copper may be added to clarify the whole, with good results.

The casting temperature, and the fairly rapid cooling of the casting in the mold, are important factors in the production of good castings, otherwise crystallization becomes pronounced according to the laws of equilibrium so clearly set forth in preceding issues of the Journal of the Institute of Metals.

The following tests have been obtained:

Tenacity, tons per square inch = 16.01, per cent. elongaton 3 inch, 10.1.

This is an average of twenty-eight tests.

INJECTOR METAL AND FITTINGS.

Copper, 84.0; Tin, 8.5; Zinc, 5.0; Lead, 2.5.

This metal has given good results in injectors, ejectors, gauge-cocks, and general details. It results in a clean casting, free from oxidation and scum in the intricate cores of the injector. The metal runs freely, and whilst the lead present may not appear to the mind of every one as necessary, it assists machining, and the author, feeling that he has no grounds for omitting it, would like to have some comments on this point.

Injectors give no trouble on the score of unsound castings in machining, and under steam tests and service.

Seatings and clacks require regrinding from time to time.

Tensile tests are good, averaging 14 tons tenacity with 11 per cent. elongation on 3 inches.

MOLDINGS.

In molding, many of the operations are common to all castings. The author does not propose to generalize upon the subject; it would involve too long a dissertation reiterating facts well known to all workers in non-ferrous metals, but he thinks that to place on record the molding of an injector in detail, together with the illustrations, Figs. 7, 8, 9 and 10 will be useful.

PHOSPHOR BRONZE.

Mr. Arnold Philip's paper on Phosphor Bronze to the Institute of Metals* has now become a standard reference, and the author will not be expected to proceed to lengthy detail here. The composition of the phosphor bronze used by the Lancashire and Yorkshire Railway Company is as follows:

Per Cent.		Per Cent.
Copper 86.0		
Tin 10.0		Copper 89.5
15 per cent. phosphor copper... 4.0	To give by analysis	Tin 10.0
		Phosphorus 0.5
100.0		100.0

It is made entirely from clean picked scrap and new ingot tin, and phosphor copper. It is used for general repairs to heavy machinery, also for mill bearings, and wheels, and pinions, where great wear takes place.

This mixture has given general satisfaction in gearing at goods yards and docks, working in worm wheels in conjunction with steel worms. It is chiefly molded in

FIG. 11. VIEW OF METAL FOUNDRY AT HORWICH, ENGLAND.

*Journal of the Institute of Metals, No. vol. i. p. 164.

dry sand, and presents little trouble in casting. It is practically free from slag, which fact is a result of the cleanliness of the materials used. It casts clean and is readily dressed.

OTHER MIXTURES IN USE.

	Copper.	Zinc.	Lead.	Zinc.	
Yellow brass	67	30	3	..	For cab rings, nameplates, &c.
Brazing metal	84	16	..	..	Pipe flanges, collars, &c.
Telegraph metal	80	7.5	7.5	5	Small castings.
	Aluminum.	Copper.	Zinc.		
Light aluminum alloys	95	5	..	..	For motor dust caps, grids, and some carriage fittings.
	85	..	15	..	

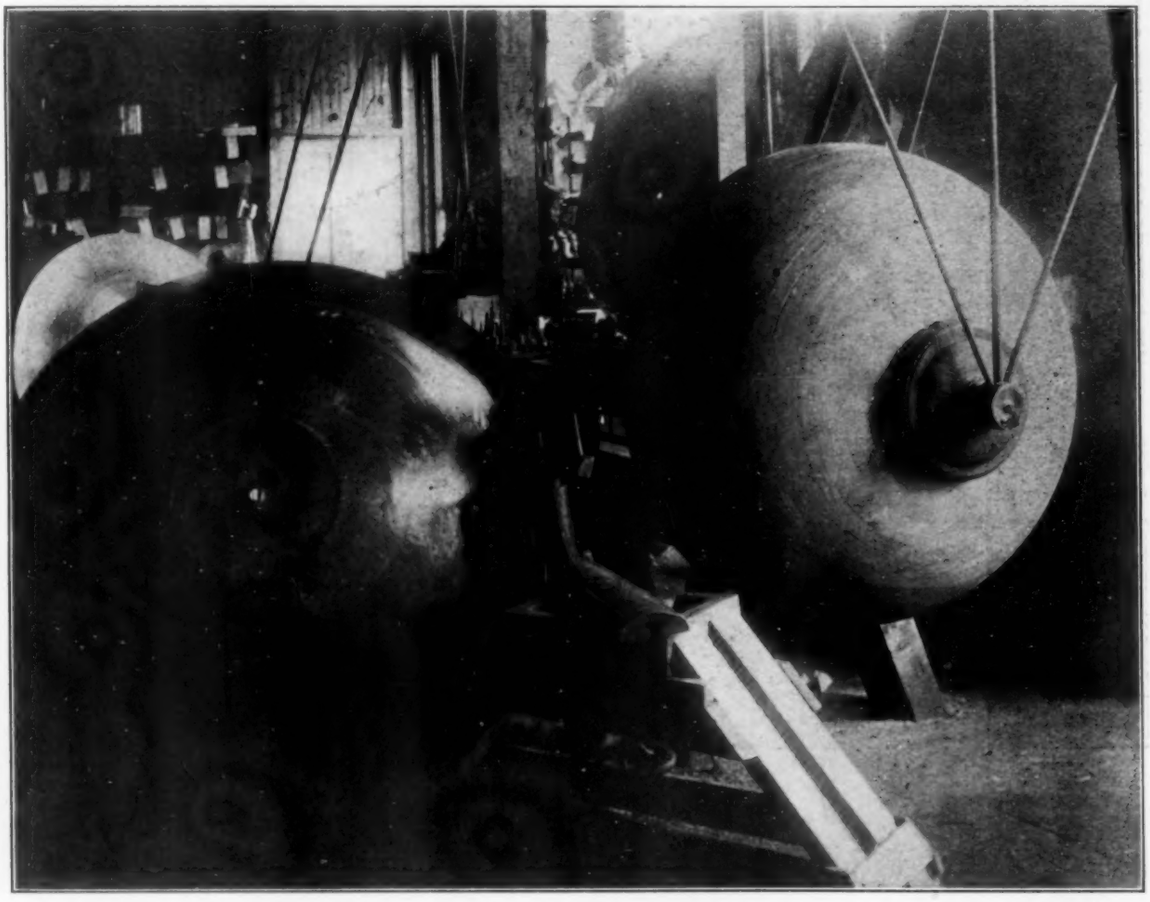
from time to time, with careful stirring. This method is preferable to the simpler one of melting the copper and antimony direct, and is found to result in cleaner metalled surfaces. The product is cast into heavy iron chill molds for use as required in the metal shop.

WHITE METALS FOR BEARINGS.

Three types of white metal are used for lining bearings:

	"A" per Cent.	"B" per Cent.	"C" per Cent.	"D" per Cent.	"E" per Cent.
Tin	82.0	11.5	80.0	54.0	85.0
Antimony	14.0	13.5	10.0	11.0	7.0
Copper	4.0	3.0	10.0	1.0	8.0
Lead	..	72.0	..	34.0	..
	100.0	100.0	100.0	100.0	100.0

THE SPINNING OF LARGE COPPER SHELLS.



The above photograph and the one on the following page show some notable metal spinning done by the Crescent Brass Manufacturing Company, metal spinners, of Cleveland, Ohio. The chuck shown above is made of boards glued together, mounted and turned off. The chuck is 58 inches in diameter and 20½ inches thick. It was so heavy that it had to be supported as shown by three rods from the ceiling to the center. A partly finished shell is shown on the left. This shell has just been annealed and is ready for another spin.

WHITE METAL.

The chief object in mixing a white metal suitable for lining bearings, axle-boxes, and big end-brasses for locomotive connecting rods, is to avoid overheating of any of the component metals. Thus, in preparing alloy "C" a primary melt is made of equal parts of copper and tin, which is cast into chills and subsequently broken into pieces to be re-melted in the required amount together with the antimony, the remaining tin being added

"A" is used for high-class axle bearings on the pinion and commutator ends of motors on the electrical rolling stock running on the Lancashire and Yorkshire Railway, between Liverpool, Southport, and Crossens. The motors have a speed of 780 revolutions per minute, at 50 miles per hour, developing 150 horse-power at the pinion. Under trying conditions of service, "A" was adopted after careful comparisons with solid gun-metal bearings and other alloys of tin and lead.

Table IV. is a record of tests made on four types of bearing metals showing percentage hot bearings, broken collars, days in use, etc., in which the suitability of this metal is clearly seen. The solid brass was the gun-metal mixture described on the preceding page.

TABLE IV.

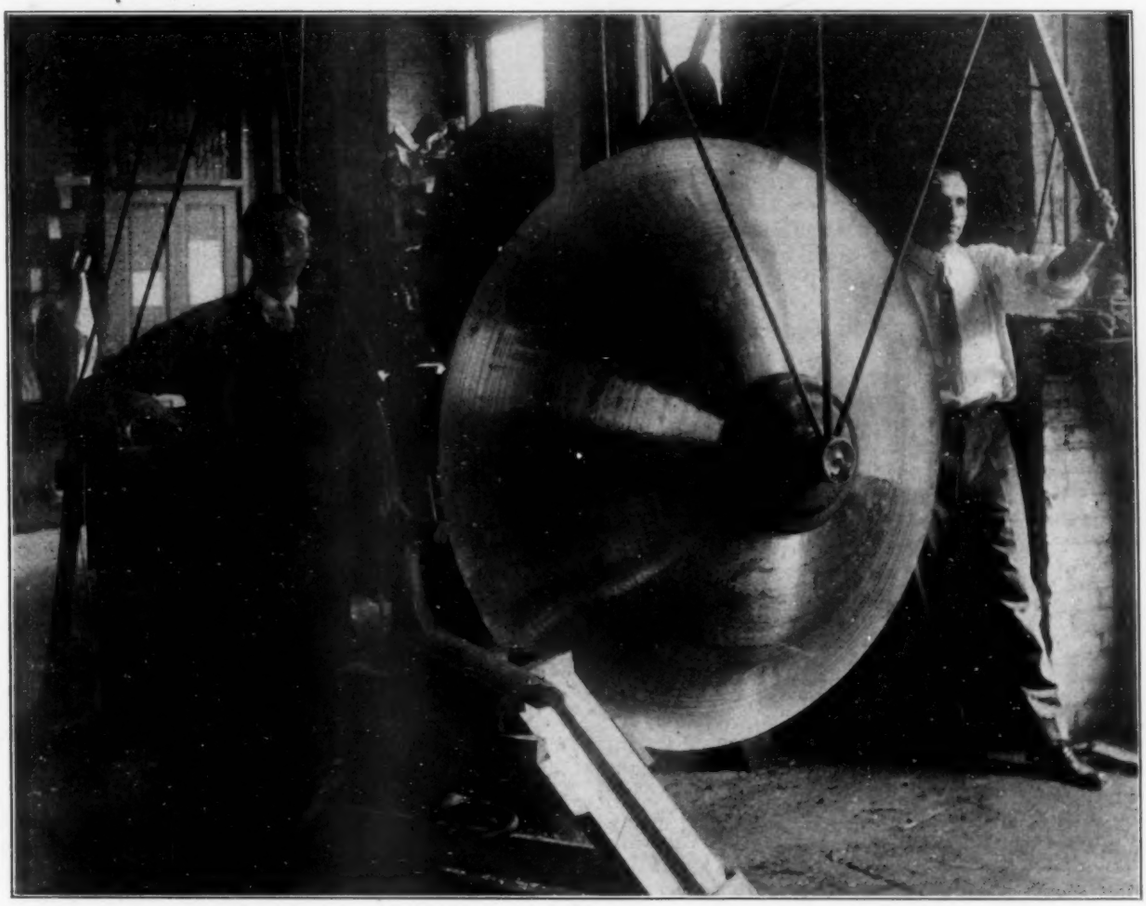
Conditions.	Solid Brass.	"D" Metal.	"E" Metal.	"A" White Metal.
No. on test	29	32	35	58
No. taken off due to wear	10	9	17	16
No. taken off hot	6	...	3	3
No. taken off with broken collars	2	22	12	18
No. still running	11	1	3	21
Average life of worn bearings, days	295	193	263	241
Average life of hot bearings, days	159	...	141	257
Average life of bearings with broken collars, days	286	191	281	215
Average life of bearings still running, days	409	447	280	406
Average life of total bearings used, days	318	189	259	299
Per cent. of hot bearings to total	20.7	...	8.5	5.1

For locomotive work a harder variety, "C," of this metal, containing 10 per cent. copper and 10 per cent. antimony, is used in big end-brasses, coupling-rod bushes, cross-heads, and certain other parts requiring a stiffer alloy than type "B," with a basis of lead; that is to say, "B" withstands pressure well, but not the hammering brought about by reversals of motion. It has done good service in lining-up main axle boxes, radial wheel brasses, reversing shafts, etc.

The success of a bearing metal alloy depends more upon structure than absolute composition, the proper distribution of a number of the tin-antimony crystals in a softer matrix of tin or lead being essential. The alloy must run cool without any cutting of the axle journal.

(To be continued.)

THE SPINNING OF LARGE COPPER SHELLS.



The large blank shown in the above photograph is made of copper 16 B and S gauge, and is 64 inches in diameter. It is mounted on the chuck shown on the preceding page and is ready to be spun into a shell 57 inches in diameter and 19½ inches deep. It required two men to operate the spinning tool and make the shells. There were four of these shells made for elevator domes for a building in New York City and were made to order for the W. S. Tyler Company, of Cleveland, Ohio. After the large shells were made the block was turned down to 43 inches in diameter and five smaller copper shells were made. The man on the right is Charles H. Hofrichter, manager of the Crescent Brass Manufacturing Company, while on the left is shown the foreman spinner.

EFFECT OF ANNEALING TEMPERATURES UPON BRASS.

The effects of varying the annealing period have been investigated. This factor has an even more important effect on the mechanical properties than the temperature factor. A temperature but a few degrees below the solidus, if only maintained for half-an-hour, will not severely burn a bar of pure brass. A temperature nearly 100 degs. Cent. lower will burn the brass if it is maintained for a sufficiently long time. Even small quantities of impurity have an important effect in increasing the tendency to burn.

ELECTROCHROMA.

A Remarkable New Method of Producing Colors By Electro Deposition.

By Charles H. Proctor.

That "Electro Chemistry has scored a new and wonderful success" would be the exclamation of any person understanding this science and having had the pleasure of seeing practical demonstrations of this new method of coloring of metals at the plant of the Rojas Electro Chemical Company, 516 West 25th street, New York City. The method is termed "Electrochroma" from the Greek word "Chroma," signifying "color" and is the invention of Mr. F. Arquimedas Rojas, who was born in the Republic of San Domingo of Spanish descent. He came to the United States at the age of 21 and has made his home in this country for the past 18 years, all of which time has been devoted to the thorough study of Electro Chemistry, relating especially to the production of colors by electro deposition. Mr. Rojas has also been an ardent student in the researches in the Physical Sciences and should feel justly proud that he has been able to contribute so remarkable a discovery as an American contribution to the progress of science.

By an invitation of the Rojas Chemical Company, the writer paid a visit to the plant of the company to see practical demonstrations of the method. Understanding the production of colors by numerous methods to some extent, it was with much skepticism that I availed myself of the opportunity offered. But to say that I was agreeably surprised would be putting it mildly, in fact, I was simply astonished by the results obtained. I made practical experiments myself, and when finally my visit came to an end I was so interested in the method that I had no idea that hours had passed by. It is my firm belief that this method will revolutionize the older methods of coloring metals and will give a great impetus to the art of electro deposition of metals. By this method of electro deposition either deposits or smuts of any desired color or texture can be produced upon any metal used as a cathode. Deposits can be produced from the electrolytes that will exhibit any desired color. Green of any shade, blue of any shade, red, violet, yellow, black, and white, etc., by the proper combinations any desired effect can also be obtained, ranging from the most exquisite colors of gold, such as green, red, rose, and French ormolu to the antique and modern finishes of bronzes. Deposits of the various tones of green upon silver can readily be accomplished by this method which heretofore has always been a perplexing problem. One of the most valuable features of the process as observed by the writer is the rapidity by which these remarkable results can be obtained in from ¼ to 2 minutes' immersion in the electrolyte will suffice to produce a beautiful colored deposit that is dense and homogeneous and with extraordinary toughness or a deposited color.

That this method of coloring is not merely a laboratory or technical product, but a commercially successful process was easily proven when a very expensive leaded art glass dome was colored with a beautiful bronze and verde tone in the space of a minute or two. Nearly all of this class work is usually colored by hand and consumes, sometimes, a day or more in finishing one piece. It is apparent that in this particular line of work its adaptability for finishing of art work in leaded glass cannot be equaled by any other method in vogue. Finishes of any desired color can be produced upon the lead; the glass being unaffected, it is left perfectly clean with a clear lustre, which is a most desirable feature. In the painting-on method a lot of time is consumed in removing the color from the glass, no matter how expert the operator may be.

By request a portable lamp base of common gray iron, slightly polished, was immersed in the electrolyte. The color suggested was a dark bronze high relief, with a patina green in the background. In the space of a minute or two, as if by magic, the color was produced, and to prove what could be accomplished in changing tones, the yellowish green of the deposit was changed by a toning solution of only a second of time immersion to a beautiful bluish green, and was finally changed back to the original tone. Mr. Rojas stated that this was one of the most important parts of the process, the facility by which the colors can be changed by the toning baths so that many variations in color can be produced. The deposits are of such a nature that they are inert to atmospheric influence, thus obviating the use of lacquers or waxes to preserve them, but when the soft opaque tones are desired, the usual method of waxing can be applied to produce the well-known egg shell finish.

Another remarkable advantage of the process is the adaptability for matching finishes. This will prove a great advantage in builders' hardware lines. The writer was informed on one occasion by the manager of one of the largest builders' hardware companies in the United States that they either had to produce or match a new color for every working day of the year. In the production of architectural bronze work and special lighting fixtures of the different periods with all their varying tones and finishes the method will accomplish wonderful results. In the various lines of manufacture, such as jewelry, novelty, chandelier, and electrical fixture lines the process can be used to great advantage over the present method of coloring. Besides the advantages cited, this process is less expensive than any other method. The depreciation of the electroplating baths by usage and shrinkage amounts to less than one cent per square foot of surface. Other advantages are rapidity of deposit and low percentage of failure in obtaining results. It can be readily seen that the cost of finishing by this method can be greatly reduced over present methods. Enough cannot be told to describe the far-reaching possibilities of this new achievement in the progress of Electro Chemistry.

The officials of the Rojas Electro Chemical Company are F. R. Rojas, president; Ralph Schoonmaker, vice-president; R. D. Schoonmaker, treasurer; Carl S. Brown, secretary.

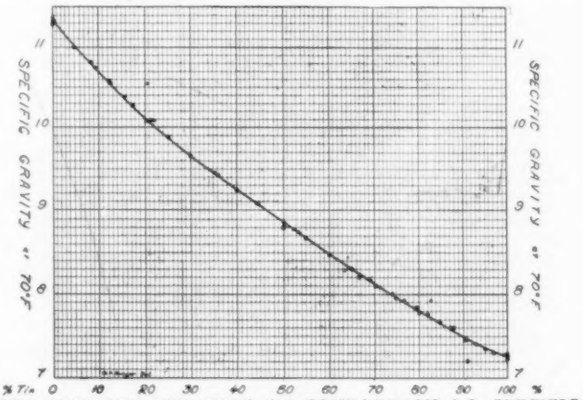
Ralph B. Schoonmaker, vice-president of the company, has played a very important part in making the process a commercial success. With clear comprehension he foresaw the great possibilities of Mr. Rojas's theories on this new scientific proposition, even before the ideas were put to a practical test, and has not spared time or money to bring the method to its present successful developments. Samples of the work accomplished can be seen at any time at the company's plant at 516 West 25th street, New York City, upon request, and practical demonstrations will be given to representatives of concerns that are interested in the method.

RAPID ANALYSIS OF SOFT SOLDER.

By Wm. P. Munger.*

WM. P. MUNGER.

While a great number of volumetric methods have been proposed for the analysis of the lead-tin compounds, none of them have replaced the well-known gravimetric method. But the length of time, equipment necessary, and the skill required to make a determination, precludes this method from the general use of the solder trade. Realizing the general need of a very rapid and approximately accurate method, Mr. Joseph Richards of the Delaware Metal Refining Company made a whole series of alloys from pure lead to pure tin, cast a billet of fixed size from each in a brass mold and weighed the billets on a delicate scale similar to the ordinary specific gravity balance and calibrated the long arm in per cent. tin. Any solder of unknown composition could then be analyzed by casting a billet in the same mold and weighing the billet on this specially calibrated balance. By this method an accuracy of one per cent. (1%) is claimed. In the note on this method (J. Am. Chem. Soc., 16, 541, 1894) the specific gravity of tin is given as 7.43. In fifteen (15) years' use of a Richards' balance, one alloy factory never found a sample of pure tin, which gave this high figure and most authorities give the density of tin as about 7.30. The author's experiments conducted with 99.89 per cent. tin gave 7.27.



CURVE SHOWING RELATION OF COMPOSITION TO SPECIFIC GRAVITY.

Even this excellent method of Richards' is not available without the special Richards' balance and mold. In those cases where an occasional analysis is required, or it is desired to continually check the composition of the alloy purchased with its supposed composition, the simplest and most rapid method is to break off a piece of the alloy or cast a billet from it, and to infer the composition from the specific gravity of this sample, using a previously prepared curve. This curve is necessary because the actual specific gravities of tin-lead compounds vary from the calculated specific gravities. A series of alloys was recently made from commercially pure metals in the laboratory of the Stromberg-Carlson Telephone Manufacturing Company, and such a curve plotted. This curve and also the published results of other observers are given in the attached figure. The results of the original work from which the curve was plotted are indicated by round dots, and the results of other observers by triangular, semi-circular and square dots.

In making the curve three billets of each alloy were cast with hot metal in a warmed iron mold, similar to the common bullet mold, and in all cases where the three billets did not have practically the same specific gravity, the three were discarded and a new alloy made up. It was observed that in the neighborhood of 16 per cent. tin ($Sn\ Pb_3$) liquation and abnormal contraction was particularly apt to occur. Around 83 per cent. tin (Sn_6Pb) the tin was easily oxidized and volatilized. Although it was not necessary to use a billet of constant volume, it was desirable because any porous castings or any error in weighing was at once discovered.

*Chemist Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

†For those who may not be familiar with the method of taking the specific gravity of metals and alloys, the following rules may be of service:

1—Weigh the fragment in the scale pan of a good balance.

2—Suspend the fragment from one pan of the balance by a fine silk thread, or fine wire, in a glass of water (distilled and recently boiled if possible) conveniently placed beneath, and take the weight again.

3—Subtract the weight in water from the weight in air.

4—Divide the weight in water by this remainder and the quotient will be the observed specific gravity.

For very accurate work the observed specified gravity must be corrected for temperature, atmospheric pressure, etc., but as a difference of seven (7) degrees either way from 70 degs. Fahr. will not affect the result in the second place, the observed specific gravity can be taken as the specific gravity and the composition of the alloy inferred from the curve.

AMERICAN ABRASIVE MATERIALS.

An Abstract from a Report of the United States Geological Survey.

Over $3,000,000 worth of abrasive materials were produced in the United States last year. All branches of the abrasive industry showed notable growth except the millstone and the grindstone industries.

The total estimated value of all the abrasive materials consumed in this country last year was $4,234,662, of which $3,010,835 worth were of domestic production. Although there was a decrease in the production of millstones and grindstones, the grindstone industry is stated to be in a healthy condition. The falling off in the production of millstones is due to the introduction of superior forms of grinding machinery, such as rolls and ball mills. In grinding wheat the rolling-mill process is now used almost exclusively.

The United States has produced no corundum since 1906, while the output of emery has dwindled, amounting in 1910 to 1,028 short tons, valued at $15,077, which was less than 2 per cent. of the importations of the article. One of the reasons for the small domestic production is doubtless the cheaper available supply of good material from Greece and Turkey, whence emery is imported crude as ballast. The importation as ballast was formerly carried on to escape the import duty, but this duty was removed in 1909 from both grain and manufactured emery.

ON THE FAILURE OF A BRAZED JOINT.*

By Henry Louis.

An explosion, unfortunately attended with fatal consequences, took place last year on the steamship *Lord Cromer*, in the steampipe of that vessel, whilst running under about 175 lbs. steam pressure. The pipe was of copper, 5½ ins. in internal diameter, and it was found that the explosion was due to the opening up of the longitudinal brazed joint of the pipe for a length of 3 ft. 6 ins.: it is proper to remark that the braze formed the lowest portion of the pipe, so that any water condensing in the latter would lie upon the braze. The braze was found to be extensively corroded, especially on the inner surface of the pipe, and the author was requested by the Board of Trade to investigate the cause of this corrosion. The full report has been published by the Board of Trade (No. 1969), hence only so much of the subject as may prove of interest to members of this Institute will be briefly summarized here. The braze was a bevelled joint, ¾ in. long, and nearly ⅛ in. thick in places, and is stated to have been made in 1897, the spelter used having the following composition: Copper, 27 lbs.; zinc, 24 lbs.; tin, 4 ozs., corresponding to:

	Per Cent.
Copper	52.68
Zinc	46.83
Tin	0.49
	100.00

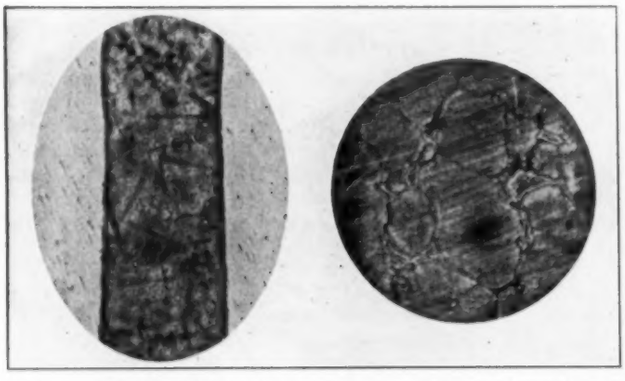


FIG. 1. SOUND PORTION OF BRAZE. MAGNIFIED 32 DIAMETERS.

FIG. 2. SOUND PORTION OF BRAZE. MAGNIFIED 230 DIAMETERS.

A section showed that the outer portion of the joint for about half its length was sound, apparently unaltered, and retained its yellow color, whilst the inner port on had been greatly attacked, had become copper colored, and could easily be broken up or detached from the copper tube; it showed numerous cavities and fissures, containing apparently basic salts of copper and zinc. An analysis† of the sound portion of the brass gave:

	Per Cent.
Copper	66.60
Zinc	31.30
Tin	0.77
Lead	0.40
Arsenic, antimony, iron	traces
Oxygen and loss	0.63
	100.00

The corroded portion was found to contain:

	Per Cent.
Copper	78.40
Zinc	13.50
Tin	0.78
Lead	nil
Arsenic, antimony, iron	traces
Oxygen and loss	7.32
	100.00

The brass was polished and etched with a 10 per cent. solution of hydrochloric acid; under a low power only the ordinary structure of a typical brass was visible (Fig. 1), but under a high power the crystals of brass were seen to be separated by a fine network of whitish alloy (Fig. 2); all the fissures and fractures of the corroded brass had exactly followed these reticulations, and it was obvious that they had formed lines of weakness, along which corrosion had taken place. If it were possible to prevent these reticulations, in all probability the corrosion of the material would to a great extent be prevented.

In order to determine the cause of this reticulated structure, a series of alloys was made up as follows:

A. Pure brass, containing 2 of copper to 1 of zinc.
B. The same as A, with the addition of 0.75 per cent. of tin.
C. The same as A, with the addition of 0.5 per cent. of lead.
D. The same as A, with the addition of 0.75 of tin and 0.5 of lead.

These were etched in the same way as the original brazing; dilute hydrochloric acid has very little effect

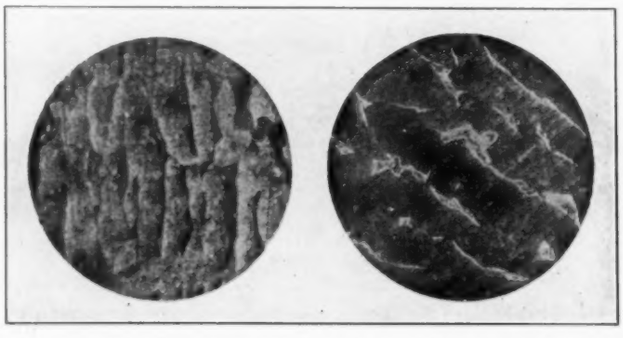


FIG. 3. PURE BRASS ALLOY AFTER ANNEALING. MAGNIFIED 230 DIAMETERS.

FIG. 4. ALLOY "D" AFTER ANNEALING. MAGNIFIED 230 DIAMETERS.

on brass, but it was found that by gripping the button of brass in close metallic contact between the jaws of a copper clip, the brass was attacked quite readily, and results strictly comparable with those of the original brazing were obtained. This method of what may be termed "galvanic" etching will probably be found useful in many other cases.

All the above alloys, when quickly cooled, showed a fine-grained crystalline structure, quite different to that of the brazing; on annealing at 800 degs. C. for half-an-hour the typical brass structure was developed, there being no indication of any segregation round the crystals of the pure brass (Fig. 3), though well marked in alloy D (Fig. 4). The same results were obtained by remelting under borax, followed by slow cooling, but the most marked results were obtained by remelting under charcoal and allowing to cool slowly; the pure brass still showed none of this reticulated structure (Fig. 5); there were indications of it in alloys B (Fig. 6) and C (Fig. 7), and it was extremely well marked in alloy D (Fig. 8).

*Paper read at Autumn Meeting, Institute of Metals, New Castle-on-Tyne, England, September 20-22, 1911.

†Analysis by Mr. H. Dean, M.Sc., in Armstrong College Metallurgical Laboratory.

I have therefore no doubt but that this appearance was caused by an alloy consisting essentially of lead and tin, much more fusible than brass, which solidifies

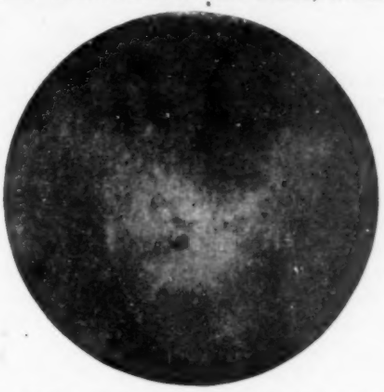


FIG. 5. PURE BRASS ALLOY MELTED UNDER CHARCOAL. MAGNIFIED 230 DIAMETERS.

about the crystals of brass; the planes thus formed constitute planes of weakness, liable to yield under strain, and thus allowing liquids to penetrate into the

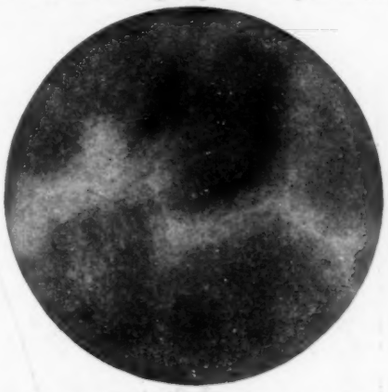


FIG. 6. ALLOY "B" MELTED UNDER CHARCOAL. MAGNIFIED 230 DIAMETERS.

mass of the metal; the liquids dissolve out the lead, a portion of the zinc, and a small proportion of tin, and thus bring about the disintegration of the brazing. It is evident that the lead is the injurious element; tin by itself appears not to be injurious, but in the presence of lead it does appear to be; it is, however, not certain whether or not 1.25 per cent. of lead would do more harm than 0.5 per cent. of lead and 0.75 per cent. of tin.

In part, therefore, these results corroborate the views of Milton and Larke,* who found in one case of corrosion by sea-water that practically all the lead was removed, but they do not support their view that tin is preservative, though the conditions of their investigation and of the present one are far from being identical. The corrosion in the present case is obviously not purely galvanic, or the lead would not be

FIG. 7. ALLOY "C" MELTED UNDER CHARCOAL. MAGNIFIED 230 DIAMETERS.

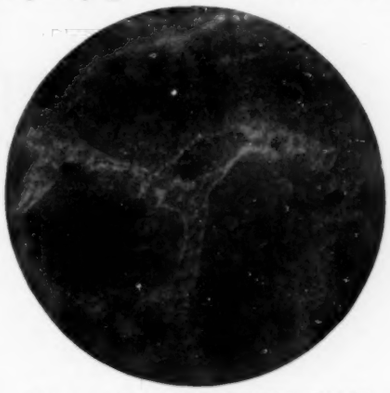


FIG. 8. ALLOY "D" MELTED UNDER CHARCOAL. MAGNIFIED 230 DIAMETERS.

the first metal to be completely dissolved; the part played by the physical structure of the metal in affording an opening to the corroding liquids is very clearly marked, and appears in this case to be the determining factor in the corrosion.

All the microphotographs illustrating this paper were taken under vertical illumination, and they were all prepared in the Metallurgical Laboratory of Armstrong College by my assistant, Mr. H. Dean, M. Sc.

*Cf. Bengough, Journal of the Institute of Metals, vol. v, p. 40.

TINNING IRON

To insure a good tinned surface for articles of iron it is well to copper them well first. The process, according to Claudius, is as follows: About 30 pounds of the articles are placed in a tumbling barrel, and there is poured therein a mixture of 20 liters of water, 1 kilogramme of sulfuric acid, 20 grammes of tin salts. The articles are tumbled for 15 minutes in this liquid; this is then poured off and replaced by pure water; they are tumbled five minutes therein and the process repeated twice with fresh water. There is then placed in the tumbling barrel a copper solution consisting of 50 grammes of sulfate of copper, 30 of sulfate of zinc and 20 liters of water, made slightly acid with sulfuric acid; and the articles are tumbled for 15 minutes in this solution. They are then rinsed with pure water and will be found to be well coppered, and bright and polished. It is better to tin them at once after this process—without drying them. The tin bath consists of a solution of three parts of cream of tartar and one of tin salt in 20 liters of warm water; the smaller articles are laid on a perforated zinc plate and placed in the bath and moved about by means of a zinc rod. In from 30 minutes to an hour they will be found to be sufficiently tinned; they are then to be rinsed and dried. Larger articles should be first pickled, then plated in a weak solution of sulfate of copper and rinsed without touching them with the hands, bound lightly with tin wire and hung in a tin bath, where they should remain until the tinning is complete. ROBERT GRIMSHAW.

THE CORROSION OF BRASS.*

With Special Reference to Condenser Tubes.

By Paul T. Bruhl, M.Sc.†

EFFECT OF OIL.

The oil used in the lubrication of the piston and slide valves should be composed of hydrocarbons only, that is to say, it ought always to be of mineral origin. It is not advisable to employ organic oils for the purpose, as they possess more body at high temperatures than do the previous class. They are subject, on the other hand, to partial decomposition in the presence of steam, giving rise to glycerine and free acid, which latter becomes a serious danger when in contact with the wall of the condenser tube. Any oil which may find its way into the condenser does so in the form of vapor, owing to the temperature in the cylinder and the continuous rush of steam from it. In the condenser the oil condenses on the tubes in the form of minute globules, which give rise to irregular corrosion.

The figures given leave no doubt that a rise of temperature up to a certain extent is favorable to corrosion, as it increases the reaction velocity between the brass and the sea water. An increase in the quantity of dissolved air also promotes chemical activity.

FIG. 1. STAGE 1 IN CORROSION. INCIPIENT PITTING.

FIG. 2. STAGE 3 IN CORROSION. HOLES IN TUBE.

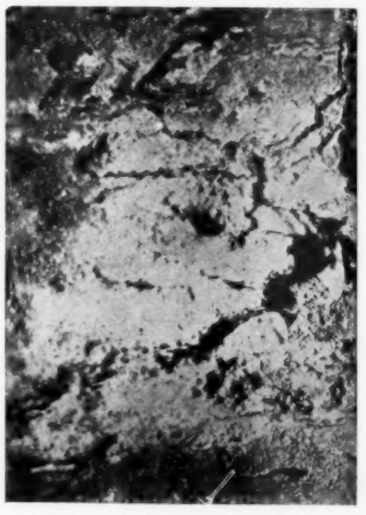


FIG. 3. STAGE 2 IN CORROSION. PITTING MUCH MORE PRONOUNCED.

The very imperfect agreement between the losses in weight of Plates I. and II. is due to the fact that the nozzle of the air duct was for the greater portion of the time placed closer to I. than to II.

The supply of sea water was changed every third week; corrosion during this period was most marked just after such renewals, the reaction velocity being proportional to the concentrations of the salts dissolved in the sea water. As the concentrations must diminish with time, the rate of corrosion, other conditions being constant, must gradually diminish.

Relative Rates of Corrosion of Muntz Metal and Copper in Salt Water.

Time in Weeks.	Muntz Metal. Per Cent.	Copper. Grammes per Sq. In.
0-1	0.00223	0.00102
0-3	0.00305	0.00347
0-7	0.0076	0.0078
0-10	0.00843	0.0107

If predictions based on the constitutions and electromotive forces of the two metals were to be made, one would certainly think that Muntz metal, by virtue of its dual structure and higher electromotive force, would be more liable to corrosion than copper. As a matter of fact such predictions would not be entirely correct. Muntz metal corrodes somewhat more than twice as fast as copper during the first week of immersion in sea water. This may naturally be expected. Why, then, does copper corrode more rapidly with further lapse of time? The most apparent cause is found by an examination of the specimens. Copper exhibits a tendency to peel, thereby incurring a mechanical loss in the first place and a chemical one in the second by the continual exposure of fresh surfaces. Muntz metal, on the other hand, shows no such tendency, although the surface becomes roughened by the unequal rate of attack of the α and β constituents. The peeling is certainly not due to any strained condition of the surface, as the copper was annealed before use. Another explanation of the greater durability of Muntz metal is that the oxide film which forms on it is a mixture of the oxides of copper and zinc whilst the film that appears on copper is cuprous oxide. Zinc oxide is very much less harmful electro-chemically than cuprous oxide because of its smaller difference of potential and higher specific resistance. Further, as the oxide film forms the cathode, hydrogen will be evolved at such negative areas; cuprous oxide is in all probability reduced by nascent hydrogen at the temperature of the condenser tube, i. e., 40 degs. C.; that it is comparatively easily reduced is seen by the fact that ordinary hydrogen reduces it at 155 degs. C. The reduction of the cuprous oxide may explain the peeling referred to above.

EFFECT OF STRAY ELECTRIC CURRENTS.

There can be no doubt that stray currents of electricity escaping from imperfect fittings increase the rate of corrosion of condenser tubes by increasing the velocity of removal from the solution of the charged ions. Troubles from this source not infrequently arise both on ships using continuous current to a great extent, and in tramway generating stations, where the negative pole is earthed. On this subject Mr. Milton, writing on the decay of metals, says:

*From a paper read at Autumn Meeting, Institute of Metals, New Castle-on-Tyne, England, September 20-22, 1911.

†Bowen Research Scholar, University of Birmingham.

"If, for instance, there is a leakage from the positive cable in such a position that part of it proceeds to the sea (earths) through the water flowing through the condenser tubes, which are, of course, clean metal, instead of through the hull of the vessel which is kept painted in order to prevent any actual contact between the iron and the sea water, some electrolytic action must take place in the tubes themselves."

The prevention of corrosion from this source can be effected by providing a good path for the stray currents outside the condenser.

"This may be done by making a connection between the condenser tube plates, the cooling water inlet, the outlet piping, and the air-pump suction piping by means of a large cable which need not be insulated, so that the condenser is, so to speak, short-circuited. As a rule, the locality of the stray currents can usually be accurately determined by careful voltage measurements, and the most suitable points for the connection of the short-circuiting cable chosen accordingly."

The importance of stray electric currents on corrosion is further emphasized by the instance cited by another writer, who states that two water-pipes, each close to an electric lead, were eaten right through in small holes, apparently punched out of the metal.

CERTAIN SUBSTANCES ARRANGED IN THE ELECTRO-CHEMICAL SCALE.

By means of the potentiometer certain corrosion products were arranged in the electro-chemical scale. The products were placed in glass tubes, and by testing one against the other their respective positions were ascertained. Sea water was employed as electrolyte.

1. Brass.
2. Zinc oxide.
3. Oxychloride.
4. Iron oxide.
5. Cuprous oxide.
6. Cupric oxide.
7. Iron hydrate.
8. Basic zinc carbonate.
9. Coke.
10. Basic copper carbonate.
11. Tin oxide.

POLARIZATION AND DEPOLARISERS.

By the passage of an electric current from brass to any of the corrosion products resting on it hydrogen is evolved at the cathode, and being a high insulator it will tend, unless removed, to stop any further action. The cathode is said to be polarized by the hydrogen, but as there is always a certain amount of oxygen dissolved in sea water, the hydrogen will be oxidized and removed to some extent. In the case of a condenser tube, polarization is very unlikely, as the bubbles of hydrogen are mechanically removed by the swirl of water. Some experiments were carried out to study the rate of polarization in still water, and a couple of typical curves were drawn. They show that the substances considered act as depolarisers in a small way by absorbing the hydrogen, but the current which can pass would eventually be very slight.

Schoch, investigating the passivity of a nickel anode in sulphate and chloride solutions, attributed the phenomenon to the formation of an oxide film of extreme thinness, and not of polarization by oxygen. Recovery from the passive state is quick in acid and slow in neutral electrolytes. An anode therefore is either dissolved or oxidized according to the character of the anions present, the tendency to oxidize being represented by the following order:

1. Halogens.
2. Sulphates.
3. Acetates.
4. Perchlorates.
5. Nitrates.
6. Chromates and hydroxides.

Some reaction must therefore take place either between the anions and the anode, or between the anions and the entering metallic ions. Alkaline acetate solutions are able to convey currents of greater density than sulphates, on account of anodic depolarization, resulting from the oxidation of the acetion to methyl alcohol. C. Russo working on the same point attributed the passivity of the nickel anode to the formation of a solid solution of oxygen with the metal surface. The fact that this passivity was observed only within the range of certain current densities, 0.1 to 0.4 amperes, would seem to show that in a ternary brass, where the third constituent has partially separated out, the ill or beneficial effect of this third constituent will depend upon its potential difference as compared with the rest of the metal. Free lead, for instance, being easily oxidized, retards corrosion.

INFLUENCE OF SURFACE IMPURITIES.

The influence of impurities on the surface of 70/30 brass is given below, but as the difficulties due to polarization could not be overcome under the conditions of the experiment, the potential differences cannot be returned in definite terms. As far as was possible, equal contact areas of the several impurities were added. It was observed that for a given area of brass

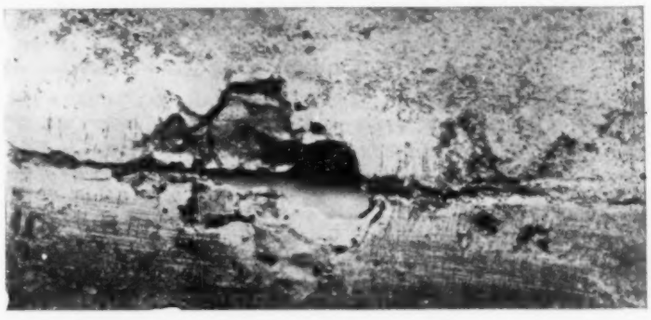


FIG. 4. CONDENSER TUBE, SHOWING SEASON CRACKING AND MARKED PITTING.

there was in the case of each impurity a certain contact area beyond which the effect became very marked. Therefore, for a given area of protecting metal only a definite extent of the other metal can be rendered corrosion proof.

	Effect.
1. Lead increases + in liquid	Great
2. Iron increases + in liquid	Great
3. Machine oil decreases + in liquid	Slight
4. Fireclay	Slight
5. Carbon	Small
6. Zinc oxide	Slight
7. Copper scale	Small
8. Brass scale	Small

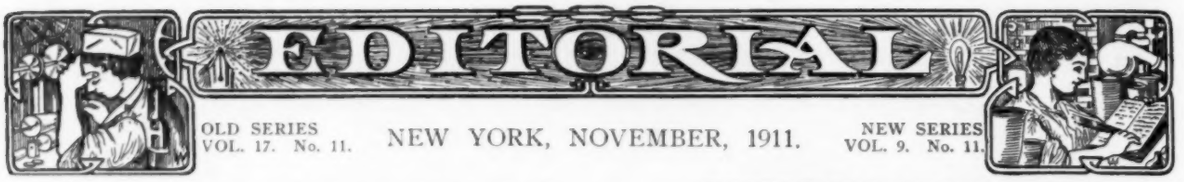
(To be continued.)

BROWN ON BRASS.

The following solution has been used to produce a number of different shades, from a greenish tone to gray light brown, also a dark brown to black on brass, with very good results:

Potassium Sulphide ..... ½ oz.
Water ..... 1 gal.

Make up the solution in the usual manner by heating. By changing the temperature of this solution the different shades can be produced; cold, a gray or greenish color; by heating to 100 degs. Fahr., a light brown to reddish brown; by increasing to 140 degs., a dark brown, and by heating to 180 degs., a black color, as all other colors of this character depend on this operation.



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THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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SCIENTIFIC MANAGEMENT

The term scientific management used in connection with the operation of an industrial establishment conveys to some people a meaning that is at once vague and mysterious. "We are introducing scientific management in our plant," says one manufacturer to another. "You are introducing it, eh?" remarks the man addressed. "We have always had it at our place." This is just the conception of the term that we find a good many of our business men (and successful ones at that) entertain regarding scientific management or systematic operation of a business. The one man regarded it as some wonderful new panacea to his business that he had gone outside of his own organization to get. The other had learned from experience that he had the right material in the confines of his own factory and had simply developed it as he developed his business.

Science is knowledge gained by experience in working, observation and correct thinking; in other words, to scientifically manage anything we must *know how* to do it, and success is only achieved in the face of competition by *knowing how* to do it better than the other fellow. Our professional sportsmen perform in their chosen fields better than others simply because they have developed their particular abilities by knowing how. Our commercial, technical and professional lights have forged to the front because of their scientific knowledge gained in their chosen field.

The application of scientific management to industrial and commercial undertakings of the present day is just now engaging the attention of the world. This is due mainly to the progressive and aggressive advance of general business which has fostered competition. Careless and thoughtless waste of our resources has resulted in investigations in methods and processes of manufacturing. These investigations have produced a result which is really organized knowledge masquerading under the name of scientific management. We publish in this issue of THE METAL INDUSTRY an article by Peter W. Blair, a foreman in one of our large brass working concerns. Mr. Blair has achieved his present position by reason of his ability to apply his knowledge, gained in his work, and by virtue of this knowledge he has become a scientific manager and is well qualified to write upon the subject. His article is well worth careful study as he states a number of interesting facts and gives some very valuable ideas as to the application of a business system in a brass working plant.

There are in existence at the present time a number of firms engaged in the business of advising people how to run their business. These firms are really business doctors and the reason for their existence may be said to

be due to competition. The cost of production of manufactured articles must be kept down to the lowest possible figure. A concern that starts in manufacturing without any previous experience and no particular "scientific" manager on its staff soon finds itself dropping behind in the race for commercial success. This is due to the fact that the pace set is so rapid that the concern in question has no time to observe and learn as it goes along and the result is a call for the systematizer and business doctor. These firms are composed of men who have made a specialty of their particular line and by combining their knowledge and ingenuity can very quickly locate the trouble of a "sick" concern and prescribe for its recovery.

A wide contrast to the modern idea of management is shown by a study of the conditions that existed in manufacturing, say, a dozen years ago. Raw material was used lavishly with no thought of the waste. Laborious and painstaking methods were employed in working up the material in finished goods and the margin of profit was large. Now we have all the labor saving devices that man can invent; the factory chemist and metallurgist watches every scrap of refuse that goes to the boiler house, sewer or dump. The heat and power economist anxiously scans the power house reports for efficiency standards. The cost statistician gives us figures that are startling in their economy. The production engineer staggers us with a maximum of production and a minimum of help, while the sanitary engineer delights us with his improvements for the betterment of the general health in the factory.

GOVERNMENT CONTROL

The recent decision of the United States Government to begin suit to dissolve the United States Steel Corporation recalls to mind a suggestion made in THE METAL INDUSTRY for February, 1910. This idea was expressed as follows:

"It might be possible that the investigation regarding trusts by the Government, now in progress, will result in time to come in establishing a 'Trust Commission' to be continued indefinitely as a part of the Cabinet, this 'Commission' to have power to regulate capitalization within certain limits in proportion to visible assets, to set a standard of profits, or, in other words, to regulate selling prices, based on actual cost of all products and commodities necessary for the maintenance of life and for the successful operation of commercial enterprises. Such a commission could effectively restrain over-capitalization and stock jobbing operations and foster healthy competition, which, after all, is the 'life of trade.'"

While it is true that there is a great deal to be said against the general attack on large corporations by the Government on the score that it disturbs economic business conditions and creates a state of unrest in all industries, on the other hand a combination of capital can wield such enormous power if it should be so disposed that the industries which it dominates may be seriously injured. And there is no possible hope of redress should there be no legislation or governmental control over the range of operations undertaken by the "trust." As an example of the harm that undue control, actuated by the greedy capitalists may do, we may cite the present state of the market regarding tin, fusel oil and amyl acetate. While the commodities mentioned are entirely, or nearly so, of foreign production and the operation concerning them are in the hands of foreign syndicates, there is no telling, were the conditions ripe, as to what ends a home syndicate (impressed by the same greed) might go to in cornering some staple or commercial necessity of home production.

THE 1912 CONVENTION

The situation this month regarding the 1912 Foundrymen's convention is about the same as it was a month ago. When we went to press with our October number we announced editorially that the question was pending whether the allied foundry associations could obtain the new 65th Regiment Armory at Buffalo, the old regimental building having been found unsuitable. As announced this month on our Association and Society page, permission has been refused to use the new 65th Regiment Armory and the executive committee are working with the State authorities to secure the 74th Regiment Armory. The 74th building is a splendid one and situated in a very attractive part of the city. If the committee are unable to secure the 74th Regiment Armory the situation would then resolve itself into making other arrangements for holding the convention of 1912.

NEW BOOKS

"TECHNICAL ANALYSIS OF BRASS." By William Benham Price, chief chemist, Scovill Manufacturing Company, Waterbury, Conn., and Richard K. Meade, director of the Meade Testing Laboratories, Allentown, Pa. First edition, first thousand. Size, 5¼ by 7¼ inches. 267 pages, including index. 17 illustrations. Bound in red cloth. Published by John Wiley & Sons, New York. For sale by THE METAL INDUSTRY. Price, $2.00.

This work, which has long been looked for, is divided into three parts. Part I consists of two chapters devoted to engineering alloys and apparatus for electrochemical analysis. The first chapter on engineering alloys gives a resumé of the alloys and their applications as used in the engineering operations, and chapter 2 gives a very complete description of the apparatus employed and necessary for electrochemical analysis of alloys. Part II of the book is taken up with sixteen chapters, comprising one hundred pages and gives full descriptions and directions for the performance of chemical, electrochemical and gravimetric analysis of the more common of the metals. Alloy Analysis is taken up in Part III, and directions are given for the examination and analysis of the various alloys met with in everyday industrial practice. The book is well and clearly written, and the directions are free from verbose covering, which renders them most easily understood by the beginner in industrial analysis. Every chemist or metal worker interested in the composition of metal mixtures and alloys should be supplied with a copy of this book.

"DROP FORGING, DIE-SINKING AND MACHINE FORMING OF STEEL." By Joseph V. Woodworth. Size, 6½ by 9½ inches; 341 pages, including index, and 304 illustrations. Bound in cloth. Published by the Norman

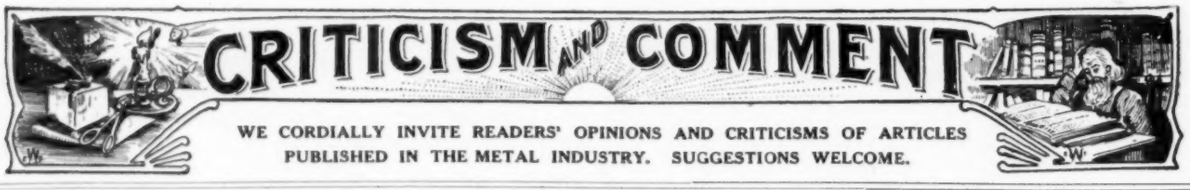
W. Henley Publishing Company, New York. Price, $2.50. For sale by The Metal Industry.

This book fills a demand of long standing for information regarding drop forging, die-sinking and machine forming of steel and the shop practice involved, as it actually exists in the modern drop forging shop. The processes of die-sinking and force making, which are thoroughly described and illustrated in this admirable work, are rarely to be found explained in such a clear and concise manner as is here set forth. The process of die-sinking relates to the engraving or sinking of the female or lower dies, such as are used for drop forgings, hot and cold machine forging, swedging and the press working of metals. The process of force-making relates to the engraving or raising of the male or upper dies used in producing the lower dies for the press-forming and machine-forging of duplicate parts of metal.

In addition to the arts above mentioned the book contains explicit information regarding the drop forging and hardening plants, designs, conditions, equipment, drop hammers, forging machines, etc., machine forging, hydraulic forging, autogenous welding and shop practice. The book contains eleven chapters and the information contained in these chapters is just what will prove most valuable to the forged metal worker. All operations described in the work are thoroughly illustrated by means of perspective half-tones and outline sketches of the machinery employed.

AMERICAN SOCIETY FOR TESTING MATERIALS—YEAR BOOK, 1911. Size, 9¼ by 6½ inches. 385 pages. Published by the Society at the office of the Secretary, University of Pennsylvania, Philadelphia, Pa.

The book is the regular year book of the society, and contains the standard specifications proposed and adopted by the association for the past year, and also contains a list of members, technical committees and other information concerning both the American Society and the International Association for Testing Materials.


CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

PATENT CONTROVERSY OVER BEARING METALS

This interesting discussion, which started in the July, 1909, issue of THE METAL INDUSTRY and which has run through the succeeding issues for the past two years, has now reached the climax of its career. The sample ingots suggested by Mr. Allan in his July, 1911, paper have been forwarded to the office of THE METAL INDUSTRY by Mr. Clamer. The letters published below explain the situation as regarding conditions agreed upon for the analysis and testing of these ingots. The ingots have now been turned over to Ledoux & Co., of New York, for analysis.—Ed.:

To the Editor of THE METAL INDUSTRY:

I have read Mr. G. H. Clamer's paper, published in the October issue of THE METAL INDUSTRY, and note that he has forwarded the ingots of alloys requested by me in my July paper. I would suggest that you engage some other metallurgist, preferably one connected with one of our engineering institutes, to co-operate with you in carrying out this test. It is my wish to have a complete analysis made of each of the alloys; the alloys then to be cast into solid bushings 5 inches in diameter by 8 inches long. Castings to be cast upright and analysis taken of the top and bottom of the castings. Kindly notify Mr. G. H. Clamer and myself when the castings are to be made, so we could be present at that time. I will not reply to Mr. Clamer's paper until the report of test is published. ANDREW ALLAN, JR.

New York, October 17, 1911.

To the Editor of THE METAL INDUSTRY:

I shall be glad to stand the expense of making castings and analysis under the following conditions, i. e., if the ingots submitted of 65-5-30 and 67-9-24 mixes show any appearance of lead sweat (metallic lead) after being cast into cylindrical shape of the dimensions specified by Mr. Allan. I know perfectly well that the ingots will show a slight difference in lead between top and bottom, and a greater difference with the 9-24 mix than with the 5-30, but this difference in lead content between the top and bottom is not sufficiently wide to be of any material importance commercially. A commercial casting is one which does not show lead sweat. To bear out my contention that such castings are commercially good, it is but necessary to observe the fact as to whether or not the castings exhibit lead sweat after casting. The 50 per cent. copper and 50 per cent. lead mix, I am satisfied, will show lead sweat in casting of size specified by Mr. Allan—that is, ingot which is made without the addition of sulphur.

The 9-24 alloy is slightly outside the limits of my diagram, as with 24 per cent. of lead the tin content should only be 8.3 per cent. With 8.3 per cent. tin the difference in lead content between the top and bottom would be less. This supports my contention that all the alloys within the range of my diagram can be made by simply weighing the metals in the proper proportions, placing them in the crucible, and if melted and cast under correct foundry conditions will result in castings which will be free from lead sweat. I make the further proposal that if such castings cannot be made in this way I will stand the expense of making such a test in the event of exhibition of lead sweat on the castings. Am perfectly willing to appoint you judge in connection with these tests, and have no preference as to where they shall be carried out. In fact, it would be perfectly agreeable to me to have them made in Mr. Allan's own foundry under your supervision. G. H. CLAMER.

Philadelphia, Pa., October 24, 1911.

MR. G. H. CLAMER,
Philadelphia, Pa.

In reply to your favor of the 24th, we note that you say you will be willing to stand the expense of making castings and analyses if the ingots submitted of 65-5-30 and 67-9-24 show any appearance of lead sweat (lead, metallic) after being cast into cylindrical shape and dimensions as specified by Mr. Allan. Mr. Allan, as you will note by the copy of the letter sent you, wished to have the ingots, in our office, analyzed before they are cast into billets. This means the three samples. In the event of these three samples proving to be the mixtures claimed for them, Mr. Allan agrees to pay for the analyses; if they do not prove to be of the claimed composition, will you stand for the cost? The above, of course, would be in addition to the cost of making castings and subsequent analyses should it be necessary to prove segregation.

We also note from your letter that you would not include the 50-50 mixture in the casting test. THE METAL INDUSTRY.

New York, October 25, 1911.

To the Editor of THE METAL INDUSTRY:

In my paper, published in the July, 1911, issue of THE METAL INDUSTRY, I made the following statement:

"I would suggest that Mr. Clamer send to THE METAL INDUSTRY 100 pounds of each of the above alloys, THE METAL INDUSTRY to have same analyzed, and if found to be of the proportions called for and strictly lead-copper and lead-copper-tin, to have said alloys recast into merchantable castings under their supervision. If these castings show no lead sweat or segregation, I will willingly assume all cost incurred by this test and concede Mr. Clamer to be one of the ablest metallurgists of the twentieth century."

It was natural for me to assume, when Mr. Clamer sent to the office of THE METAL INDUSTRY in accordance with my suggestion, the ingots of alloys specified, that he was agreeable to the conditions called for and fully understood their intent. He makes the statement in his letter that he knows that the ingots will show a slight difference in lead between top and bottom, yet fails to state what he would consider as slight. My opinions on merchantable castings are quite different from Mr. Clamer's views. Mr. Clamer is not correct in his statement that the limits of his diagram is 8.3 per cent. tin to 24 per cent. lead. To be exact, the limits of his diagram are 8.6 per cent. tin to 24 per cent. lead. I expect Mr. Clamer to agree to conditions under which he forwarded the ingots to your office. Why not?

New York, October 26, 1911. ANDREW ALLAN, JR.

To the Editor of THE METAL INDUSTRY:

Replying to yours of the 25th, I see no particular advantage in analyzing ingots before making the castings. Analysis after remelting is practically the same as before. Nevertheless, I am willing to stand the expense of having these analyzed, providing they do not show within the commercial limits on each metal the compositions as follows: 50 and 50; 65 5-30 and 67-9-24. I specify, however, that borings be taken from each of the ingots by drilling all the way through them, then grinding the borings and mixing them in the standard fashion. I note from Mr. Allan's letter that he desires to make analysis from top and bottom of the castings. It has been my experience that in the 5 and 30 mixture, in castings of this kind, there is a difference of probably 3 per cent. lead in the top and bottom, and on the 9-24 mixture the percentage difference would be greater, because the tin is a little bit too high in proportion to the amount of lead present.

My claims have always been that alloys made within the limits of my diagram will not show lead sweat, and that no sulphur is necessary to prevent them from showing lead sweat. The 9-24 mixture is not sufficiently far outside of my diagram to actually produce lead sweat, but there is greater tendency to segregate than there is in the 5-30 mixture. This proves conclusively the claims of our patents, i. e., that in order to increase the lead it is necessary to decrease the proportion of tin present. This is a fact that I have been trying to emphasize in my discussions.

My proposition, therefore, is as follows:

1. I will pay for analysis in the event of samples being taken as above stated, and not showing within commercial limits the aimed at proportions. Furthermore, if they show more than a very small percentage of sulphur, such as would be taken up in process of melting, and using all pure tin, pure copper and pure lead.

2. I will pay for the tests if the 65-5-30 and 67-9-24 mixtures show any lead sweat after casting into cylinder 5 inches in diameter and 8 inches long. If they should show lead sweat there is no necessity for analysis, as the evidence of segregation is emphatic.

Regarding my being present when these tests are made, shall be very glad to do so if I can make it convenient, but I am perfectly willing to allow you to act as judge in the matter, entirely without my presence, as there is nothing further to determine other than that the ingots are melted in crucible, that nothing is added to them, and cast in accordance with regular foundry practice. G. H. CLAMER.

Philadelphia, Pa., October 26, 1911.

To the Editor of THE METAL INDUSTRY:

I will not at this time comment on Mr. Clamer's letter of October 26 as a whole other than to say that his attitude, like that which he has displayed throughout the controversy, convinces me of the absolute necessity of having the conditions governing this series of tests set forth in a most explicit manner. The following are the conditions to which I expect Mr. Clamer to agree:

First.—Complete analyses to be taken of the 65-5-30 and 67-9-24. The borings, as Mr. Clamer suggests, to be taken from each of the ingots by drilling all the way through them, then grinding the borings and mixing them in the standard fashion. The analyses must come within the following proportions:

	65-5-30.	67-9-24.
Copper	64. to 66.	66. to 68.
Lead	29. to 31.	23. to 25.
Tin	5. to 4.9	9. to 8.6
Sulphur, not over	.05	.05
Nickel	None	None
Impurities	.2	.2

Second.—The alloys to be then cast into solid bushings 5 inches in diameter by 8 inches long, castings to be cast upright. Whether the castings exhibit lead sweat or not, analyses are to be taken from the top and bottom of the castings to determine the percentage of segregation.

Third—If the 65-5-30 alloy does not show a difference of lead content between the top and bottom of more than 1 per cent., and in the 67-9-24 alloy of not more than 1½ per cent., I will assume all cost incurred by analyses and test.

I do hope Mr. Clamer will agree to have this test go through, as I, like the readers of your valuable paper, am very much interested in seeing what really can be accomplished in this art by ordinary foundry practice. ANDREW ALLAN, JR.

New York, October 30, 1911.

To the Editor of THE METAL INDUSTRY:

Replying to Mr. Allan's letter of October 30, Mr. Allan is evidently not familiar with commercial limits, as the variation he has placed on tin in the 65-5-30 mix is not even the commercial limit allowed in chemical analyses, i. e., 2/10 of 1 per cent. The following are the limits allowed in printed specifications of some of the most prominent users of bearing metals:

Name.	Copper. Per cent.	Tin. Per cent.	Lead. Per cent.
Baltimore & Ohio Railroad	2	1	3
Chesapeake & Ohio Railroad	..	2	3
Norfolk & Western Railroad	..	2	3
New York Central Railroad	2	2	2
National Railways of Mexico	4	2	2
Pennsylvania Railroad	2	2	3

Other specifications, such as Pressed Steel Car Company, American Locomotive Company and other large users, are even more liberal. I will, however, pay for analysis if the 65-5-30 and 67-9-24 ingots do not come within the following range, sample taken as agreed by both Mr. Allan and myself:

Copper	64 to 66	65-5-30 mix
Lead	29 to 31	
Tin	4.50 to 5.50	
Sulphur	Not over .05	
Nickel	None	
Impurities	.2	
Copper	66 to 68	67-9-24 mix
Lead	23 to 25	
Tin	8.50 to 9.50	
Sulphur	Not over .05	
Nickel	None	
Impurities	.2	

The only difference in the above, you will note, is on the spread of tin content, and this is as low as called for on Baltimore & Ohio Railroad specifications, which has the narrowest limit of any specifications I know of. Furthermore, I will pay for the casting test if the castings made from the ingot supplied, made in accordance with stipulation of Mr. Allan, show lead sweat. Should they not show any lead sweat, the test will have proven any statements which I have made in this controversy.

The difference in lead content between top and bottom, providing the castings show no lead sweat, is certainly not sufficiently wide to commercially effect the value of such alloy for bearings. As I have already written you, the difference in 65-5-30 mix will be about 3 per cent., and in the 67-9-24 mix slightly more than this. Even in the face of this admission Mr. Allan has stipulated 1½ per cent. If Mr. Allan desires to prove any point in connection with segregation of lead in these castings, by making analysis of top and bottom, as compared with the same composition made by the "Allan" process, he is at perfect liberty to make such investigation, but the expense in such case will have to be shouldered by him. I suggest also that it would be interesting to have analysis made of the same alloy with addition of sulphur, as compared with alloy made by the Allan process, providing the Allan process is anything different from the plain addition of sulphur. G. H. CLAMER.

Philadelphia, Pa., November 1, 1911.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Kindly advise us what you consider a good formula for speculum metal.

A.—Standard speculum metal is composed of

Copper	68¾
Tin	31¼

Different shades of yellow are obtained by increasing the copper content, while with a large tin content shades of blue are formed.—K.

CLEANING

Q.—Will you please give us the formula for an electric cleaner, using sal soda?

A.—Try the following formula for an electric cleaner, using about 6 volts:

Caustic soda	1½ lbs.
Sal soda	1¼ lbs.
Cyanide of potassium	½ oz.
Water	1 gal.

Use at a temperature of 150 degrees. A wrought iron or steel tank should be used for the purpose of electro cleaning. The positive connections can be made direct to the tank. If any other form of tank is used anodes of sheet iron will have to be used. These should have plenty of exposed surface, so that the gases will generate freely.—C. H. P.

COLORING

Q.—We are sending you three buckles that are not gold plated, but gold lacquered. Can you advise us how this is produced? We want a rich gold color, it cannot be at all brassy.

A.—The reason you cannot get the rich gold color you desire by lacquering is because you do not use the proper methods. The buckles submitted to us were colored in the following manner: First, after brass plating and finishing in the usual manner, the buckles should be cleansed, then dip lacquered with a good heavy transparent dip lacquer. Second, after lacquering, the goods should be dried thoroughly and then left to harden for some hours. Third, a dip is prepared, consisting of fusel oil, to which is added aurine aniline, which is a dye. The best method to pursue in preparing this dip is to dissolve as much of the coloring matter as possible in denatured alcohol, producing a highly concentrated color; then after the color settles add sufficient to the fusel oil to give the correct color. A little experimenting will be required. The buckles for dyeing are placed upon wire, preferably soft iron, one-half gross at a time and then immersed in the dye. This colors the lacquer. The operation must be accomplished quickly. Shake well and immerse in clean, cold water and then dry by the aid of heat. You may be able to pass through hot water to assist in the drying. The color in this instance would have to be a trifle lighter than when drying from the cold water, because heat has a tendency to deepen the tone. We are of the opinion that lacquer and color for the purpose of gold dyeing may be obtained from the lacquer advertisers in THE METAL INDUSTRY.—C. H. P.

DEPOSITING

Q.—Please tell me through Shop Problems how to obtain a bright deposit on cast iron.

A.—Make up a bright copper solution in the regular way from cyanide of potassium, carbonate of copper and bisulphide of sodium, and use very hot. Then dry carbonate of lead should be dissolved in a strong solution of caustic soda, adding all the lead the solution will absorb. A small amount is then added to the hot copper as a brightener. Add a few ounces to each 100 gallons of solution first, and as the deposit changes note the amount added. An excess will show a whitish deposit, while too little will produce a dark deposit; therefore, go slow, the same as you would in adding arsenic to a brass bath.—C. H. P.

DIPPING

Q.—Can you give me a formula for finishing the inside of aluminum saucepans?

A.—For producing a white finish on the inside of aluminum saucepans the simplest process to use is the regular dipping method. To accomplish this, dissolve one-half pound of caustic soda in each gallon of water. The soda solution should be used at a temperature of 150 degrees. If you do not wish to finish the outside, it will be necessary to pour a little inside of the pans, so that with a little motion the soda solution will attack the entire inside surface. This operation should only consume a few seconds; then replace the soda solution in the receptacle arranged for it; then wash your pans in clean, cold water. Now prepare an acid mixture consisting of four parts nitric acid and one part sulphuric acid (use commercial acids). Use the acids in the same manner by pouring in the pans. This removes the oxide of aluminum formed and produces a white surface. Replace the acids, then wash in cold water and dry by the aid of boiling water, sawdust or heat. It would be better to immerse the whole article, if possible, as the manipulations could be done much quicker.—C. H. P.

DRILLING

Q. Having had considerable trouble drilling small holes in ½ inch O. D. brass tubing, said tubing being used for needle bath sprays. Size of drill used is No. 70 twist, nine holes to the foot, or one hundred and twenty holes in each spray, the drills break on an average of every ten holes.

A. Use a high speed sensitive drill press on solid base to avoid any vibration and at a speed of two thousand five hundred revolutions per minute, using jeweller's twist drills. Allow the drill to extend out of the drill chuck or holder one-quarter of an inch and lubricate with water or lard oil.—P. W. B.

FINISHING

Q.—I am sending you a piece of tin with a finish similar to brass. Can you tell me what the finish is and how it is applied?

A.—This is not a regular lacquer, although sometimes termed a tin lacquer. It is made from gum copal dissolved in turpentine and the addition of linseed oil. It obtains its yellowish-green color from yellow aniline dissolved in turpentine and added to the varnish. If you notice the coating is resolvent it does not chip, showing its oily consistency. It is also called a tin decorating varnish, and is largely used by decorated tin manufacturers. The method used for coating the tin sheets was by flowing it over the surface. It is probably done now by spraying. Quantities of lacquer tin are made and then worked up into articles. The pressing or stamping does not affect the lacquered surface.—C. H. P.

FLUXING

Q.—I am having trouble in soldering steel to copper with a blow pipe. I have tried numerous soldering fluids, but none have given satisfaction; the regular acid cut down with zinc does not answer. Will you kindly favor me with a fine preparation for soldering fluid?

A.—For a soldering fluid for your purpose dissolve one part of lactic acid and one part of glycerine in eight parts of water. If this flux works too slowly, add small proportions of your regular chloride of zinc soldering acid until you obtain the best results. Another flux that gives good results is to add to your regular soldering acid equal parts of glycerine and wood or denatured alcohol. The trouble you experience is the oxidation of the copper. Either of the above fluxes should overcome your trouble.—C. H. P.

GENERATING

Q.—Can the three-wire system be used with one dynamo, and if so, where are the three wires connected with the dynamo?

A.—A special dynamo is built for the three-wire system; it cannot be arranged from the regular two-wire dynamo. Up to a 1,000-ampere capacity the dynamos are built for self-exciting; above that capacity they are separately excited from a 110-volt dynamo or from a direct current 110-volt lighting circuit. For practical information relative to the installing of the three-wire system in electroplating, see the article by Royal F. Clark, on page 62 of the February, 1909, issue of THE METAL INDUSTRY.—C. H. P.

GOLD PLATING

Q.—Kindly publish formulas for green and yellow gold solutions, to be used on lacquered work, the lacquer being cut away from the places to be colored.

A.—For a yellow gold solution for your purpose try the following:

Water	1	gal.
Phosphate of soda	6	ozs.
Bisulphite of soda	1	oz.
Cyanide of potassium	6	dwts.
Neutral chloride of gold	7½	dwts.

Use the solution as warm as possible, as long as it does not affect the lacquer. Use anodes of 22 karat gold.

For a green gold solution use the following:

Water	1 gal.
Potassium cyanide	2 ozs.
Chloride of gold	9 dwts.
Chloride of silver	3 dwts.

Use this solution as cool as possible to avoid the deposition of the gold in excess, thereby producing too much of a brassy tone instead of a green. A gold anode can be used varied with a small piece of silver to maintain the correct tone.—C. H. P.

PLATING

Q.—We are sending you two pieces of brass finished with Hawkins' gun metal solution, one with brass and the other with nickel anode. Kindly let us know why we do not get a good finish.

A.—The trouble you experience with the Hawkins' black nickel or gun metal solution is presumably because you use too strong a current, and your solution does not contain enough arsenic. The formula is somewhat antiquated. Try the following for your purpose:

Double nickel salts	8 ozs.
Sulpho-cyanide of ammonia	2 ozs.
Sulphate of zinc	1 oz.
Water	1 gal.

Use nickel anodes and a low voltage, which should not exceed 1 volt. If the solution deposits streaky, add a few drops of ammonia, 26 per cent. Baumé. This solution will give you an intense black if worked properly.—C. H. P.

Q.—Can you give me a formula for making an iron bath; also tell me where I can obtain ferrous ammonium chloride?

A.—You can produce an iron bath in various ways. The following is a very simple formula:

Sulphate of Iron and Ammonia	1¾ lbs.
Sal Ammoniac	4 ozs.
Water	1 gal.

Use anodes of soft sheet iron. Any good chemical house should be able to furnish you with chloride of iron and ammonia which is the common name for ferrous ammonium chloride.—C. H. P.

POLISHING

Q.—How can I produce a high polish on iron watch cases?

A.—To produce a high polish on iron watch cases, polish with 120 emery to get a surface, then with 180 emery and finish with a tampico wheel and emery paste. Wooden wheels, leather covered, will give the best results or solid felt wheels can be used. Sometimes instead of brushing, what is termed glazing is done, which is accomplished by using walrus or bullneck wheels and applying a little tallow to the surface, which is usually coated previously with flour emery and glue, and then fined down with a flint stone. Sometimes a little flour emery paste is applied to the wheel instead of the tallow which contains some grease and paraffine wax.—C. H. P.

SOLDERING

Q.—Can you tell me of a good paint to put on stock to keep the fire from it when soldering it?

A.—Try mixing yellow ochre or other dry color with sodium silicate; this is commonly termed water glass. It can be purchased at any chemical house at a cost of about six or seven cents per pound. This application should overcome your trouble.—C. H. P.

SPOTTING OUT

Q.—Will you kindly tell me through your journal if there is any way to prevent brass castings spotting out from the small sand holes?

A.—The trouble you experience is due to pin holes in the surface of the metal. Boiling out in cream of tartar water or platers' compound, added in the proportion of one-half ounce to the gallon, will usually overcome the trouble; or if the articles are immersed several times from the cold to boiling hot water and then vice versa, you may overcome the trouble, due to the expansion and contraction of the metal. The contraction ejects water and the expansion absorbs it, so it is possible to wash the pores of the metal in this manner.

C. H. P.

TINNING

Q.—I am tinning small articles, such as nails, in a wire basket, and find that the articles stick together after they are dipped and immersed in kerosene oil. Can you suggest a remedy?

A.—You would probably obtain better results if you were to use two tinning kettles for small work, such as you mention. The trouble you experience is that your articles cool too quickly, larger pieces, of course, retain the heat long enough to shake off the excess tin. We suggest that you arrange a second tinning bath, maintain it at a temperature of 400 degrees and cover the surface of the tin to a depth of ½ inch with tallow or cocoanut oil. Tin your basket articles in the first bath, shake well and immerse in the second bath for a second or two; then remove, shake rapidly and immerse in kerosene oil as usual. The tallow or oil acts as a flux and if your motions are sufficiently quick, the sticking together should be overcome.—C. H. P.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

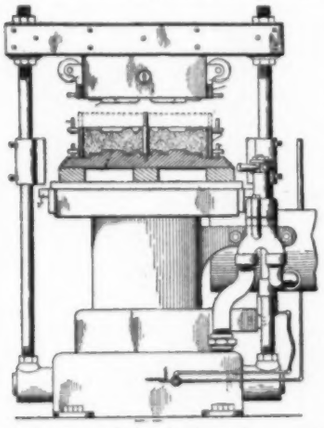
1,002,133. August 29, 1911. Process for the Treatment of Metals and Alloys. George Bryant, Finsbury Park, London, and C. H. Toinson, Ilford, England.

This is a process for the treatment of metals and alloys, including solders, which melt at a comparatively low temperature, with chemical reagents that will purify the same to some degree by cleaning them with fluxes to remove undesirable substances, such as silica, oxides of extraneous metals, etc. Such metals, moreover, mix and alloy readily with one another when in a molten state. In the case of the solder oxidation is prevented so that perfect union of the solder with the metal or alloy to be joined is secured. The process consists essentially in bringing the metals or alloys, while in a molten state and in a fine state of sub-division, into contact with a flux or successively into contact with solvents containing the chemical reagents in a state of solution. After treatment the particles are removed and may be remelted for use.

A preferred method consists in passing the molten metal through a sieve and allowing the minute drops to fall into the cleaning solution, or layers of solutions containing the chemical.

1,001,887. August 29, 1911. Molding Machine. J. A. Rathbone, Utica, N. Y. Assignor to Rathbone Molding Machine Company, Detroit, Mich.

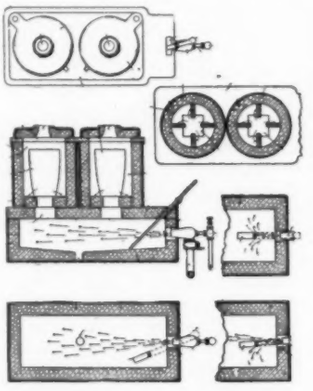
It is the object of the invention to obtain a construction of molding machine which is particularly adapted for use in the so-called, "multiple molding," i. e., where the sand in the mold flask has molding faces formed on the opposite sides thereof for adjacent mold cavities. In the formation of molds of this character, the compacting of the sand is effected by the relative movement of opposed pattern faces, each of which forms a portion of a mold cavity. The lower pattern face forms the base, supporting the sand during compression, and the upper pattern face is pressed into the upper portion of the sand, the relative movement being continued until the sand is compressed to the proper density.



It has, however, been found in practice, difficult to form a good molding face at the top of the flask and, as a consequence, the use of the machine for this purpose has been limited. The difficulty is due to the fact that the pressure of the upper pattern face into the loose sand produces varying degrees of hardness in the face of the mold cavity. Thus, the lower portions of the surface, formed by the deepest projections of the pattern, are usually hard, when the upper portions, formed by the interstices of the pattern, are so soft as not to permanently retain their shape. With the present invention, shown in cut, this difficulty has been overcome, primarily, by increasing the velocity of the movable part to such a degree that the compacting of sand against the upper pattern face is due to inertia; furthermore, this results in compressing the sand into all the interstices of the upper pattern face at the beginning of the sand compression, and subsequently compressing the body of sand between the opposed pattern faces, until the proper density is acquired.

1,003,444. September 19, 1911. Melting Furnace. J. R. Flaherty, Cincinnati, Ohio.

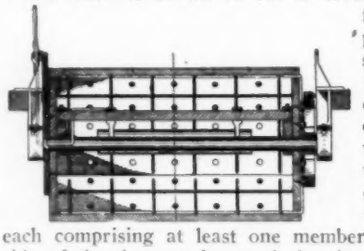
This patent covers a melting furnace wherein a crucible which holds the metal to be melted is heated by the combustion of oil or gas. Heretofore in this class of melting furnaces it has been customary to lead the injector from which the fuel is discharged into the chamber upon the bottom of which the crucible was seated. The objections to this are that the flame wore away the crucible, the bottom of the crucible was not heated evenly with the rest of it, and the full heat of the combustion was not had in the crucible chamber. The object of the invention is a melting furnace, as shown in cut, in which the maximum effect of the heat is secured in the crucible chamber, in which the bottom and sides of the crucible are thoroughly heated and in which the crucible is not cut by a direct blast of flame from the fuel feeder.



1,004,119. September 26, 1911. Electroplating Apparatus. John Weber, Jr., and Obidiah Cope, Toledo, Ohio.

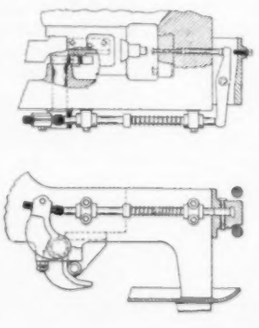
This invention relates to apparatus for the electroplating of metallic articles, and has reference more particularly to that class of such apparatus embodying a rotatable drum or container into which the work to be plated is placed.

The machine shown in cut is covered among others by the following claim: An apparatus of the class described, a rotatable drum, a segmental commutator carried by an end of the drum, an electrical brush working on said commutator, and a plurality of cathode units disposed interiorly of the drum and each comprising at least one member which is secured to the side of the drum and extends longitudinally thereof, cross-arms attached to said members, said members each having an end projecting without the drum and connected to a commutator segment.



1,004,247. September 26, 1911. Ejecting Mechanism for Heading Machines. E. W. Duston, Waterbury, Conn., assignor to The Blake and Johnson Company, Waterbury, Conn.

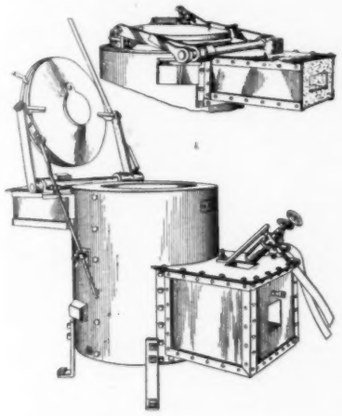
This is a machine for forming heads on bolts, screws, and the like, and more particularly to the mechanism for ejecting the blanks from the machine after the heads have been formed thereon. Bolt heading machines as usually constructed comprise a die for holding a blank from which a bolt is to be made and a heading punch arranged to strike the blank held by the die and upset a portion thereof left projecting from the die to form a head. such machines are usually provided with mechanism for ejecting the headed blanks from the die, said ejecting mechanism having a portion which is engaged by suitable means on the head which carries the punch when said head is retracted and by which said ejecting mechanism is operated.



By reason of the fact that the blank, during the heading process, is more or less upset in the die, so that considerable force is required

to eject the same, and for the further reason that the force of the punch head is exerted quite suddenly upon the ejecting mechanism when brought into engagement therewith, breakage sometimes occurs which may result in injury to the operator or in damage to property caused by flying parts of the broken ejecting mechanism. It is one of the objects of the present invention to overcome the difficulties above referred to, and this has been accomplished by the mechanism shown in cut.

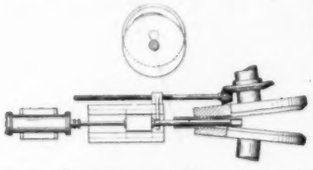
1,004,925. October 3, 1911. Furnace Cover Attachment. D. R. Steele, Curtis Bay, Md., assignor of one-half to H. D. Harvey, Baltimore, Md.



This invention comprises means shown in cut for removing and replacing the covers of furnaces for melting metals, whereby the cover, when removed from the furnace, is automatically turned so that its lower side will face away from the top of the furnace, thus permitting the workmen to remove the crucible containing the molten metal without being exposed to the heat radiating from the side of the cover which has been subjected to the intense heat of the furnace.

1,005,091. October 3, 1911. Apparatus for the Manufacture or Production of Weldless or Seamless Metal Tubes. C. F. Williams, Erie, Pa., and Wm. Dicks, Dumbarton, Scotland.

This invention relates to the treatment, production or manufacture of seamless metal tubes and refers to processes wherein a pierced tube or billet is subjected to pressure by or between rotary rolling devices which act to reduce the thickness of the walls of the tube as it is passed between them. This invention refers to processes known in the art of tube-making as "stepwise rolling."



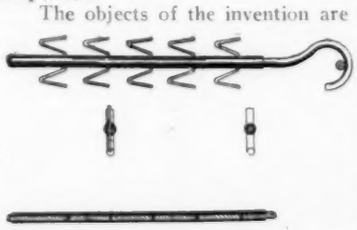
According to the present invention, the acting or reducing surface, as shown in cut, comprises two portions arranged to act successively upon the same portion of the billet or tube. The first portion of the reducing surface is disposed so that it acts on the tube or billet in a direction that is oblique to or inclined to the axis of the tube's rotation, and operates upon the entire length of that part of the tube that has been last fed forward to be reduced or acted upon, and the second portion which acts upon the same portion of the billet or tube rotates or moves in a plane parallel with the longitudinal axis of the tube.

1,005,870. October 17, 1911. Device for Supporting Articles in an Electro-plating Bath. M. L. Packer, Columbus, Ohio.

The device shown in cut is for supporting articles in an electro-plating bath.

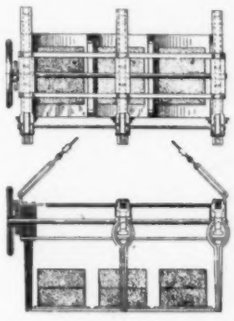
In carrying out the invention, it is proposed to provide a support of the class described, whereby the articles to be electroplated may be suspended in the bath, and whereby the electric current may be readily conducted to the main rod of the support and to the individual supports from which the articles are suspended.

The objects of the invention are to provide a device of the type referred to wherein the supports for the individual articles are so combined and correlated with the main body portion or rod of the device, that said individual supports may be readily connected to and removed from the main rod. And also to provide a rod having an outer sleeve of insulated material, the individual supports for the articles to be electro-plated, passing through the main rod in such manner that they may be readily inserted and removed therefrom, so that should one of the supports be broken or otherwise injured, it may be readily and quickly removed and a new one inserted.



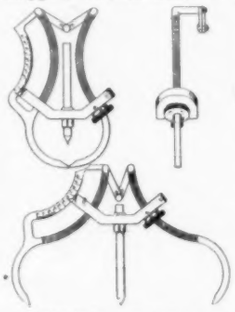
1,005,986. October 17, 1911. Mold Conveyor for Foundries. Geo. T. Leroux, Toledo, Ohio.

In foundries much time and heavy labor are consumed in handling flasks and molds, and, more especially, in conveying the molds to the sand heaps and in dumping the molds to recover the castings. When the metal is poured the molds are usually arranged in rows, at suitable intervals, and after the castings are made it is important to have the sand dumped and the castings recovered as rapidly as possible. This work is extremely laborious, since it is usually performed manually.



The invention relates to and its object is to provide means shown in cut for overcoming the difficulties and objections here indicated, and, more particularly, to furnish a device by which a number of flasks or molds may be simultaneously and rapidly lifted, conveyed and dumped with but slight exertion on the part of the operator.

1,006,660. October 24, 1911. Micrometer Calipers. R. C. Keppie, Providence, R. I.



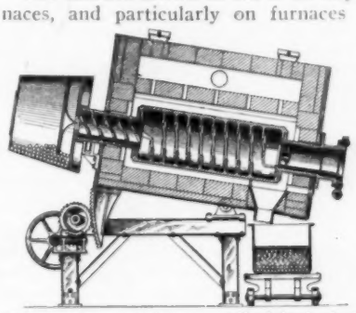
This invention relates to calipers or dividers, as shown in cut, and has for its essential objects the combination of the functions of locating the centre and ascertaining the outside measurements of objects; a capacity for indicating in a single device not only micrometric measurements, but those of greater magnitude; in providing a maximum range of movement of the legs and speed in moving the same. A further object is to provide means for centering the pointer.

1,006,849. October 24, 1911. Pyrophoric Metal Alloy. Geo. F. Hofman, Munich, Germany.

A pyrophoric metal alloy that consists mainly of manganese and antimony with a small addition of metallic cerium.

1,007,021. October 24, 1911. Annealing Furnace. E. S. Davis, Jersey City, N. J., assignor to Rockwell Furnace Company, New York.

The furnace shown in cut is an improvement on annealing furnaces, and particularly on furnaces for treating small objects such as balls, cartridges, blanks, and other small parts.



In furnaces for annealing small objects, there is usually employed a conveyor for conveying the objects under treatment from one end of the furnace to the other. This conveyor is usually what is known as a worm or screw conveyor in the shape of a tubular or cylindrical shell having an internal screw-thread, the shell being rotated by any suitable means. There is a tendency of the blanks or objects being treated to become lodged or caught in the conveyor while in transit from one end of the furnace to the other. The principal object of the invention is to prevent the objects under treatment from becoming caught or stuck in the conveyor. Other objects of the invention are to improve and simplify the construction of the furnace.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

ELECTROPLATING DEMONSTRATING PLANT

A Description of a Practical Layout for the Plating and Finishing of Metal Goods.

The Hanson and Van Winkle Company, manufacturers of electroplating materials, of Newark, N. J., have fitted up a complete electroplating plant where the apparata and methods designed and manufactured by the company can be clearly and thoroughly demonstrated to intending customers. We show this plant in the two photographs here reproduced.

One of these pictures (Fig. 1) gives a general view of the department in question. This shows, in the left-hand corner, steam-jacketed kettles containing solutions of cleaning compounds. Next to these is a steel welded seamless tank containing a Kostico cleaning solution, used in place of the ordinary potash solutions, so commonly employed. This particular tank is fitted with upright rods, operated from main line driving shaft by the aid of switches provided for, to the necessary rinsing and cleaning tanks, the barrel holding the work being immersed bodily into these, after which the barrel is then carried by the same track system to a centrifugal dryer, into which the contents are emptied. The work when handled in this manner can be thoroughly dried within about two minutes, thus eliminating the necessity of using sawdust, which is very objectionable in the plating room, for the reason that the fine powdered sawdust is carried in small particles to the surface of the various plating solutions.

The other photograph (Fig. 2) shows a gang of four mechanical electroplating machines in actual use. In one of these the revolving plating barrel is shown, raised from the tank by the

FIG. 1. A GENERAL VIEW OF THE DEMONSTRATING PLANT.

by cams, thus allowing the dip baskets attached to the end of the rods to be given a constant vertical, agitated movement in the tank, which aids very materially in hastening the cleaning of the work, and also adds to the thoroughness of same. The wooden plating tank at the left of photo represents a plating solution tank, fitted with movable rocker motion cathode rods, provided for a constant agitation of the work while the metallic deposit is in progress. At the right hand of the picture is shown a mechanical plating apparatus with the revolving plating barrel resting across the top of the tank. While this photo at first glance would seem to indicate a complicated plant, this will not be found to be the case if looked into carefully.

Particular attention is called to the overhead single track arrangement whereby the work is removed while still in the barrel, by a hand wheel lifting device, and then carried by trolley use of a hand wheel lifting and carrying device, which runs on a trolley system. This plating barrel is claimed by the makers to be particularly adapted for the electroplating of quantities of small work in bulk, saving time, labor and expense.

The cost of plating articles which in the absence of mechanical plating apparatus must be strung or plated in trays has led to the introduction of various kinds of plating barrels more or less efficient. The cheapening in the cost of plating by the use of such apparatus has been so apparent that everything introduced to the market has been tried, but in the majority of instances, due to some mechanical or electrical defect, the plating barrel has been abandoned. In the apparatus shown in Fig. 2 both the electrical and mechanical features have received close attention and have been much simplified. The barrel is entirely submerged, thus permitting a much larger

quantity of work in each batch. The drive is from the outside, thus avoiding the use of belts running in the solution. Two speeds are provided for. The barrel is removable at any time without throwing off the belt or interfering with the drive. The whole apparatus is strongly built and consists of an outer wooden tank for containing the solution, a perforated revolving plating barrel, made of wood or celluloid, in which to hold and tumble the work while deposition is going on, all necessary rods and connections, and a special patent countershaft.

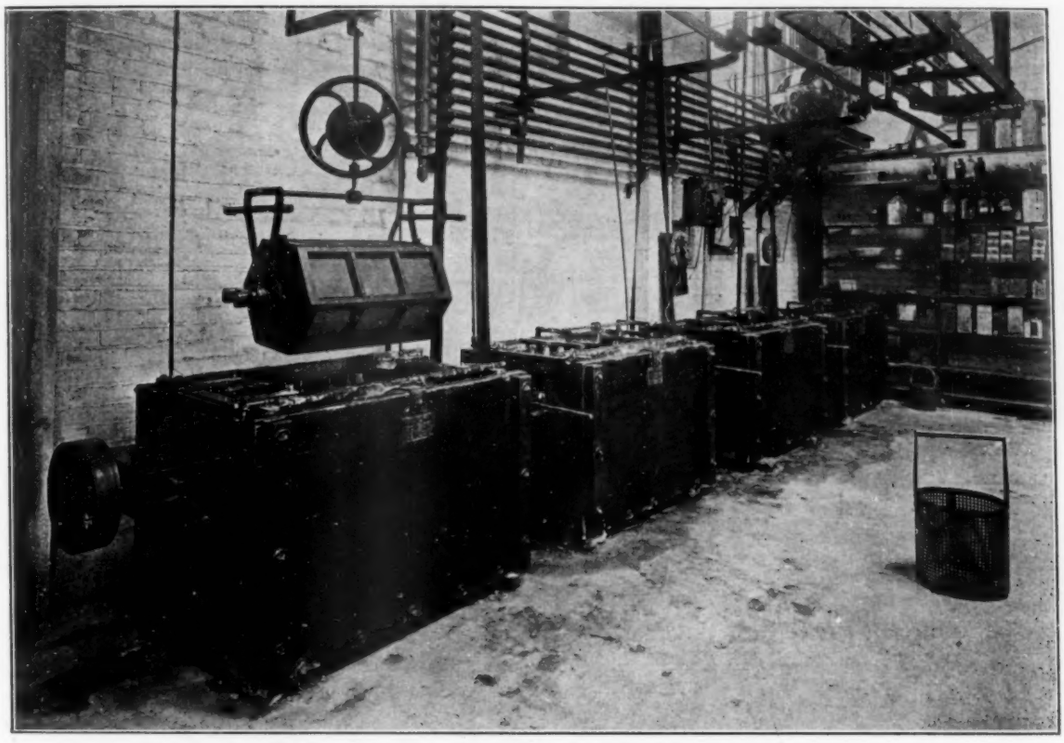


FIG. 2. SHOWING A GANG OF FOUR MECHANICAL ELECTROPLATING MACHINES IN ACTUAL USE.

Pamphlets and catalogues relating to the above machinery and supplies may be had by writing to the Hanson and Van Winkle Company, Newark, N. J.

NEW USES FOR MAGNESIUM

C. W. Leavitt and Company, importers of metals, New York, have begun the manufacture of the following new alloys of magnesium:

Magnesium tin alloy as a deoxidizer for tin mixtures such as Britannia metal, solder, etc.

Magnesium zinc alloy as a reducing agent for zinc castings of figurative nature.

Magnesium aluminum alloy as a refining agent for all kinds of aluminum castings. This alloy is lighter than pure aluminum.

Magnesium lead alloy to be used in refining lead and antimony mixtures. This alloy makes the metal more liquid and tends to avoid the formation of sweepings. The Leavitt company handle large quantities of magnesium and have the following to say:

"Pure magnesium metal is one of the most powerful deoxidizing agents on the market, and its value is being demonstrated in many branches of foundry practice, including iron, steel, aluminium, copper, nickel, zinc, tin and lead mixtures.

"Owing to its great affinity for oxygen, magnesium offers an excellent means for improving the tensile strength of these alloys, and this result is obtained by the use of a very small percentage of magnesium. Pure copper castings require not more than 2 ounces magnesium to 100 lbs. copper, and magnesium is the best deoxidizer for copper castings requires a high conductivity. In yellow brass mixtures, about one-half ounce magnesium is used to 100 lbs. brass; and in bronze about ½ up to 1½ ounces magnesium to 100 lbs. bronze. For brass intended for rolling, not more than 0.01 per cent. magnesium should be used. Ordinary nickel-copper mixtures require about 1½ ounces magnesium to 100 lbs. of nickel-copper alloy. The specific gravity of magnesium is 1.74, and as it is lighter than aluminum, it is used with excellent results in the manufacture of light weight castings. The magnesium-aluminum castings containing 8-10 per cent. magnesium are about 15 per cent. lighter than the alloy of aluminum and copper, and also about 33 per cent. stronger than the aluminum-copper castings."

There are a number of patents covering magnesium mixtures, of which the following may be noted:

"Duralum" (by J. G. Mellen):

Aluminum	79%
Magnesium	11%
Phosphate copper	10%

Walter Rubel, of Berlin, has patented the following mixture:

Magnesium	94 to 99%
Zinc	1 " 6%

This has a specific gravity of 1.8 per cent.

Mr. Enrique Touceda patented an alloy of

Cadmium	96.50%
Magnesium	3.50%

for bearings, and patents have been issued on lead-magnesium mixtures for bearing metal. For some time an alloy of copper, zinc and magnesium has been used by manufacturing jewelers for making gold alloys. By its use firecracks are obviated, and the gold is quite ductile.

Brittania metal, like all tin alloys, on being rolled has the drawback of showing a high degree of porosity due to the formation of tin oxide, and it has been demonstrated that magnesium will, to a large degree, remove this oxide. Owing to its high melting point, magnesium is not added to the Brittania mixture in its pure

state, but in the form of a tin alloy containing about 10/20 per cent. magnesium. After the magnesium-tin alloy has ben heated, it is added to the Brittania melt in the usual way. A good quality of tin is used for this alloy; about 0.10 per cent. magnesium is sufficient for deoxidizing and refining the metal. It serves not only as a deoxidizing agent, but also enhances the flexibility of the material and does not jeopardize the pure white color. It has been demonstrated that magnesium is also an ideal deoxidizing agent for antimonial lead alloys. It aids in preventing porosity and securing a uniform color and for obtaining a homogeneous, finely grained structure. In this work a 10 per cent. magnesium-lead alloy has been used, and according to the composition of the antimonial-lead mixture about 0.10 per cent. to 0.30 per cent. magnesium is used.

NEW WIRE WORKING MACHINERY

A Description of an Installation for the Cold Rolling and Drawing of Rods and Wire.

The Philadelphia Roll & Machine Company, Philadelphia, Pa., have just completed a number of specially designed wire and rod machines, some of which are illustrated herewith, which present a number of interesting features. The machines were built for Shimer, McGlynn and Company, of Philadelphia, the design and construction being under the supervision, and in accordance with the ideas of Mr. Wm. P. McGlynn, the general manager, who has embodied in them a number of special features which will appeal to practical wire men. One of the machines referred to is the back pointing and cold rolling mill, which is shown in Fig. 1. This machine is belt driven, has two pulleys and is fitted with a duplex reversing friction clutch, which can be operated either by means of the foot-treadle shown or by an automatic stop device at the rear of the mill. The rolls run at 75 r. p. m. in the regular operating direction and 100 r. p. m. in reverse direction when operating on ordinary material. The machine was designed to point or cold roll rods from ¾ in. to 3/16 in. diameter, and is of especially heavy and strong construction to meet the requirements of the hard Monel metal which Shimer, McGlynn and Company intend to produce. The housings and all cast iron parts are made from high-grade charcoal air furnace iron, the rolls of high carbon cast steel, and the gearing of bronze, with the exception of the large wheel, which is cast steel. All gearing is cut. Gear shields have been provided which completely incase the gears, which, however, were removed when the photograph was taken. The mill in all its parts reflects a refinement of design and strong construction.

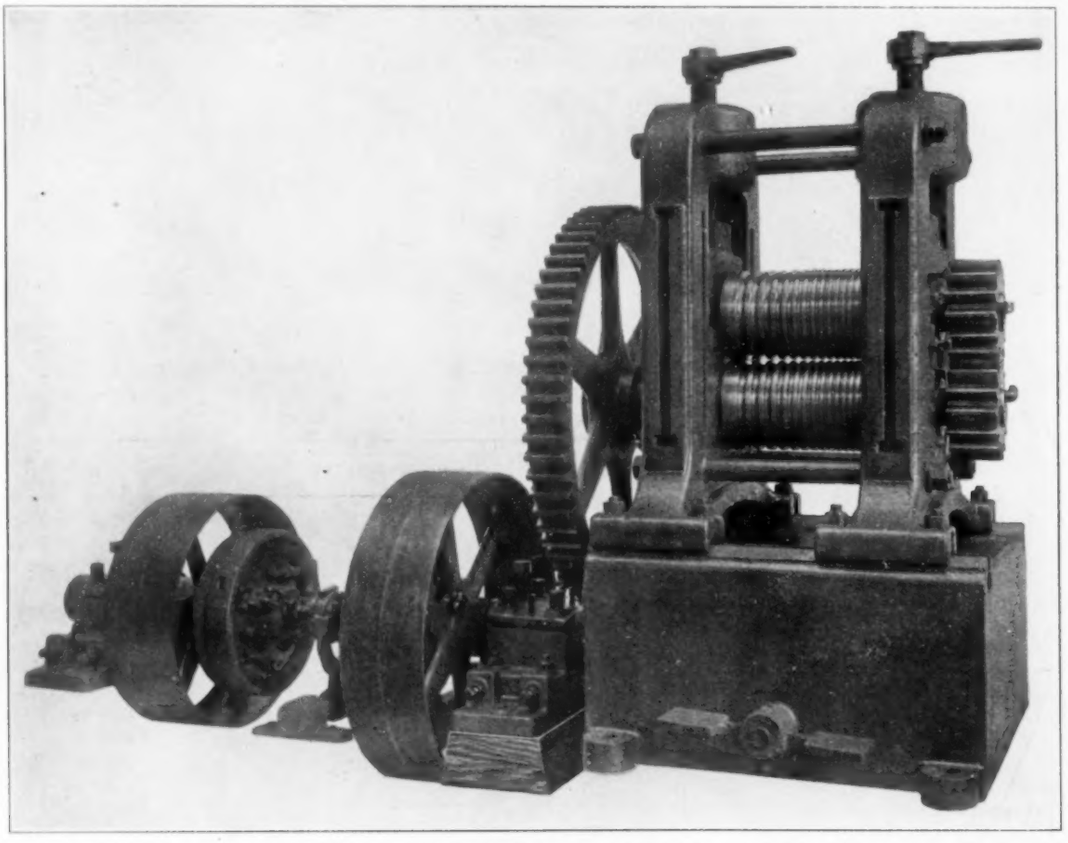


FIG. 1. BACK POINTING AND COLD ROLLING BELT DRIVEN ROD ROLLS FOR ROLLING RODS FROM ¾ TO 3/16 INCHES.

The large wire machine, which is shown in Figs. 2 and 3, was designed to draw rods from ¾ in. diameter to ¼ in. diameter. It is a triple geared machine and has a gear ratio of 20 to 1. The wire block, which is 14 ins. diameter, is designed to run at 20 r. p. m. when ordinary material is being drawn, this speed being varied to suit the material. All the spur gearing in connection with the machine have cut teeth, and the bevel gears cast teeth, all the cast iron working parts being made of charcoal air furnace iron. As will be noted the machine is very compact and entirely self-contained. It is belt driven and provided with a friction clutch, which is capable of transmitting 50 h. p. at the ordinary speed of the machine and which is operated by the foot-treadle shown. It is also provided with special cut off pins which connect the wire block to a large coupling which is secured to the vertical shaft, the wire block being loose and free to revolve as desired when the pins are withdrawn. These pins are within the wire block and do not show on the photograph.

In accordance with the latest tendency to provide safeguards wherever possible, the gearing and all mechanism, both on the front and back of the machine, have been completely encased, panels having been provided which are easily removed, and yet afford absolute protection to the operator. Fig. 2 shows the machine with panels removed and gearing, etc., exposed, while Fig. 3 shows panels inserted as they will be when machine is in operation, and serves to illustrate how complete the operator is

protected. The frame of the bench is charcoal air furnace iron and channel construction, with all joints machined and fitted. Suitable spreaders are also provided between the die and block frames where the heavy strain incident to wire drawing occurs. Particular attention is directed to the construction of the center frame which supports the wire block and the vertical shaft with its gear, and which is of a particularly strong substantial design, the construction of the entire machine being notably strong and commending itself at once to the practical eye.

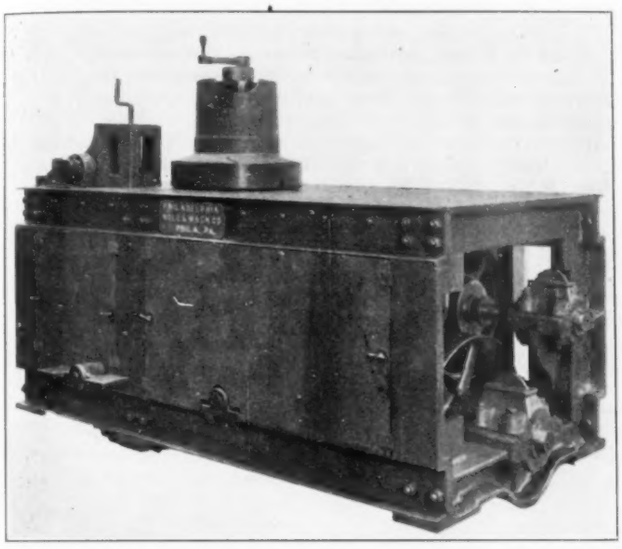


FIG. 2. WIRE DRAWING MACHINE WITH 14-INCH BLOCK.

The vise on the wire block is cast steel with tool steel jaws and is not rigidly secured to the block but is fitted over the vertical shaft and into a recess provided in the outer diameter of the block. This arrangement gives a very strong support to the vise when in operation and yet permits a worn or disabled vise to be removed and a new one inserted in a few moments

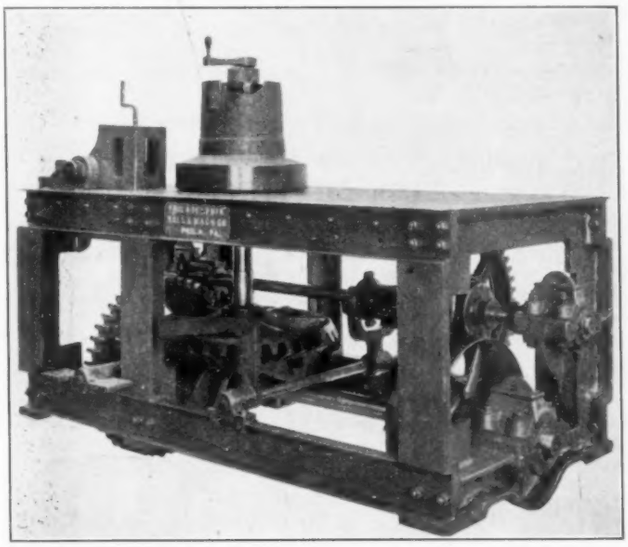


FIG. 3. WIRE DRAWING MACHINE WITH COVERING REMOVED.

without interfering with the block. This feature also applies to the vises on six smaller machines, which are in process of construction, but which are not illustrated, these machines being constructed in units of one block each instead of larger units as usual on account of the widely varying characteristics of the different metals they are intended to produce, this condition making it necessary to run the different blocks at varying speeds.

THE NEW EPSCO SPRAYER

The latest spraying device, the Epsco Sprayer, made by the Eureka Pneumatic Spray Company, 276 Spring street, New York, and shown herewith, is simplicity itself. It embodies the exact principles of the improved Model Eureka Sprayer, but instead of having a pot attached to same, means are provided for a flexible hose to be attached, which may be inserted in a can of lacquer or paint and material sucked out, permitting the operator to handle this small sprayer up, down, and in every direction, without fear of spilling, and to get in and around places where any sprayer with a pot attached would be unhandy or perhaps impossible. The absolute safety in using this and other sprayers of the Eureka line is claimed by the makers to be undeniable, as the material is not forced to the fluid tip, but sucked up to the same by a vacuum created through the air blast blowing across the fluid tip. As a result the spray starts and stops instantly and there is no danger of leaky valves, causing material in the pot to be emptied unawares.

THE NEW EPSCO SPRAYING DEVICE.

This feature in the Eureka line of sprayers is a strong one. Also means are provided on this sprayer for the operator to hang it up, so there is no excuse for ever laying it down, which might cause it to fall to the floor and become damaged. All Eureka sprayers are provided with this hanging attachment. The Eureka Pneumatic Spray Company being the originators of the spraying system, and having an organization of twelve years standing, claim they are in a position to furnish the best, most durable and most practical line of sprayers. In offering this new sprayer at $5 each there is certainly no reason why every one should not have one, who has use for same. This sprayer will also be found very valuable in the foundry for spraying molds and cores, and by so simple an operation as screwing the fluid tip down, it will cease to be a sprayer, and molders may use it as an air blast in place of the old fashioned bellows. It is therefore practically two tools in one at a low price and will no doubt be appreciated by manufacturers. A large stock of all models of sprayers, all sizes of air compressors, air tanks, fixtures, etc., is at all times kept in stock at their New York storerooms for prompt delivery.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

J. Burke has accepted a position as foreman plater with the R. Neumann Hardware Company, Newark, N. J.

J. Cecil Nuckols, who for the past seven years has been advertising manager of the S. Obermayer Company, Cincinnati, Ohio, has resigned in order to accept a position as advertising and sales manager of the Otis Hidden Company of Louisville, Ky.

David Van Alystyne, vice-president of the Allis-Chalmers Company, of Milwaukee, Wis., who has been in charge of the manufacturing department, has resigned and will engage in business in New York. C. E. Search, formerly Mr. Van Alystyne's assistant, has been appointed works manager.

Theodore Kauffmann is now the treasurer and general manager of the S. Obermayer Company, of Cincinnati, Ohio, taking the place of Harry F. Frohman, who died on July 5, 1911. Mr. Kauffmann was manager for seventeen years of the Chicago plant of the S. Obermayer Company. Mr. Frohman had been with the company since 1886, starting with the organization from the time he graduated from the Hughes High School, and subsequently rising to the position of secretary and treasurer.

Percy S. Brown, a charter member and the first secretary of the National Electro Platers' Association, has severed his connection with the Western Electric Company as electrochemist, and is now connected with the B. O. Bowers Company, commission merchants, New York. While Mr. Brown is no longer connected directly with the plating trade, he does not intend to lose track of this industry. Mr. Brown is a well-known contributor to the columns of THE METAL INDUSTRY, and it is to be hoped that he will continue to write.

Some important changes have recently been made in the personnel of the Waterbury Brass Goods Corporation, the most important being the resignation of George H. Benham, as secretary and treasurer, although it is stated on good authority that Mr. Benham will continue to be connected with the American Brass Company, but in what capacity we are unable to state. John P. Durfee, who has represented the company as a salesman, now becomes secretary, and James L. Smith, cashier, will take the place of assistant treasurer. It is believed that John A. Coe, president of the company, will become the treasurer.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

INTERNATIONAL CONGRESS ON CHEMISTRY IN 1912

Committee appointments for the eighth International Congress of Applied Chemistry to be held in New York City and Washington, D. C., in September, 1912, have been practically completed and pamphlets giving the constitution and by-laws, general rules, committees and official representatives may without doubt be obtained from Dr. Bernhard G. Hesse, secretary of the congress, 25 Broad street, New York. The opening meeting is to be held in Washington, September 4, but the other meetings, both business and scientific, will be held in New York September 6 to 13, inclusive.

One of the sections has to do with metallurgy and mining and its work is in the hands of an executive committee assisted by a corresponding sectional committee. The personnel of these committees is in part as follows:

President, Joseph W. Richards, Lehigh University, South Bethlehem, Pa.

Vice-President, J. B. F. Herreshoff, Nichols Copper Company, General Chemical Company, 25 Broad street, New York City.

Secretary, Walter S. Landis, Lehigh University, South Bethlehem, Pa.

Arthur L. Walker, Columbia University, New York City.

James Douglas, Phelps, Dodge & Co., and El Paso & Southwestern Railroad Company, 99 John street, New York City.

Sectional Committee.

Lawrence Addicks, United States Metals Refining Company, Chrome, N. J.

Alfred H. Cowles, Sewaren, N. J.

James Gayley, 71 Broadway, New York City.

John Hays Hammond, 71 Broadway, New York City.

P. Heroult, 149 Broadway, New York City.

Henry M. Howe, Columbia University, New York City.

H. H. Laughlin, Jones & Laughlin Steel Company, Pittsburgh.

J. A. Mathews, Halcomb Steel Company, Syracuse, N. Y.

Richard Moldenke, American Foundrymen's Association, Watchung, N. J.

THE FOUNDRY AND MACHINE EXHIBITION COMPANY

President, H. R. Atwater, Cleveland, Ohio; Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill.; Treasurer, J. S. McCormick, J. S. McCormick Co., Pittsburg, Pa. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the Company are for the commercial and technical education of iron and metal industries by co-operating with all foundry and manufacturing interests in making an annual exhibit of supplies and equipments in connection with the meeting of the American Foundrymen's Association. The next exhibit and convention will be held probably in Buffalo, N. Y.

Secretary Hoyt makes the following announcement:

"The Annual Meeting of The Foundry and Machine Exhibition Company was held in Pittsburg, October 30, 1911. The recommendation of the directors, made at a meeting in Buffalo, September 15, 1911, that a 20 per cent. dividend on the amount paid for space at the Pittsburgh Exhibit be paid to all exhibitors who had exhibited for two consecutive years, and that a 20 per cent. dividend be held in reserve for all who exhibited for the first time at Pittsburgh to be paid them should they become exhibitors in 1912, was endorsed and ordered paid.

"R. S. Buch, of A. Buch's Sons Company, J. W. Campbell,

of the Cleveland Wire Spring Company, and E. A. Pridmore, of the International Molding Machine Company, were re-elected directors, and George R. Rayner, of the Carborundum Company, was elected a director to fill a vacancy.

"The Board of Directors organized by electing H. R. Atwater, president; R. S. Buch, vice-president; J. S. McCormick, treasurer; C. E. Hoyt, Secretary; and F. N. Perkins, R. S. Buch, and George R. Rayner, members of the Executive Committee.

"At a meeting of the directors held in Buffalo, September 15, for the purpose of completing plans for the 1912 Exhibit, it developed that the old 65th Regiment Arsenal, which had been offered for exhibition purposes, would not be available on account of contemplated alterations not being completed in time. The Buffalo Committee at once went to work to secure, if possible, the magnificent new 65th Regiment Building, but at the Pittsburgh meeting it was reported to the directors that concessions for this building could not be secured. At the same time a communication was received advising that the 74th Regiment Armory could be had if the building was found suitable for exhibition purposes, and provided certain conditions specified and others to be specified later were complied with.

"The Executive Committee were instructed to go to Buffalo at an early date and investigate this latest proposition from there, and it is hoped that conditions will be found acceptable and that Buffalo's well organized Foundrymen's Committee will be rewarded for work done by the securing of the Joint Foundrymen's Conventions for 1912."

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

President, Frederick A. Geier, Cincinnati, Ohio; First Vice-President, Charles H. Alvord, Torrington, Conn.; Second Vice-President, Samuel H. Reck, Rockford, Ill.; Treasurer, Albert E. Newton, Worcester, Mass.; Secretary, Charles E. Hildreth, Worcester, Mass. The objects of the Association are to promote the interests of machine tool builders in the direction of good fellowship and the liberal discussion of subjects relating to the improvement, standardization of parts and methods of manufacturing machine tools. The Association meets annually in the Fall in New York City and semi-annually in the Spring at places selected by vote of the members at the annual meeting. Correspondence should be addressed to the secretary, Chas. E. Hildreth, Worcester, Mass.

This association has issued an alphabetical and segregated list of the membership. The list is contained in pamphlet of 35 pages and the manufacturers of various classes of machinery are grouped in such a manner as to enable anyone to instantly ascertain all concerns manufacturing some particular class of machinery.

At the annual meeting of this association held at the Hotel Astor, New York, October 10 and 11, the following addresses were given: "Task Work as a Basis for Proper Management," Henry L. Grant; "Shop Hygiene as a Factor in Efficiency," Winthrop Talbot; "Standardization of Machine Tools with Relation to the Interchangeability of Fixtures and Cutting Tools," L. P. Alford.

ELECTRO-PLATERS' ASSOCIATION

President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Royal F. Clark; Recording Secretary, Edward Faint. All correspondence should be addressed to the Corresponding Secretary, Royal F. Clark, 246 Fulton avenue, Jersey City, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

The thirty-third regular meeting of the association was held October 27, President Charles H. Proctor opening the meeting at 8:15 p. m. The roll of officers was called and showed that every officer was present, as follows:

William J. Schneider, first vice-president; R. H. Sliter, second vice-president; Royal F. Clark, corresponding and financial secretary; Edward W. T. Faint, recording secretary; H. H. Reama, treasurer; H. J. Stremel, librarian; George B. Hogaboom, editor-in-chief; Thomas E. Haddow, sergeant-at-arms; Thomas Noonan, assistant sergeant-at-arms, and George B. Hogaboom, Hugh Baxter, H. D. Havens, F. P. Davis and Benj. Popper, trustees.

Two associate and two active members were elected, after which all other routine business was deferred until the next meeting. President Proctor then delivered an interesting address based on the fact that this was the first public meeting that the association had held, and judging from the attendance of over sixty, he said that such a showing was very encouraging for the continuation of such open meetings.

W. A. Jones, general manager of the Celluloid Zapon Company, gave an interesting talk in which he outlined the particular advantages that the association offered to a foreman plater in becoming a member. The main theme of his talk was in relation to power to observe, power to absorb what had been observed, and the power to apply; that is, to put in practice what was observed. He said that if a foreman plater did not possess the power to observe, he had better give up the business and devote his energies to something else. He ended his address by describing the development of the silver industry in Sheffield, England, and made an appeal to foremen platers to become active members, and others who were eligible, to become associate members of the association.

Clarence G. Backus, of Backus & Leeser, spoke briefly as to the benefits of membership in the association, and related some personal information regarding some of the present members who had by constant application become experts in their chosen calling.

M. B. Chase, New York manager of the Sangamo Electric Company, gave a detailed description of the Sangamo ampere hour meter, and illustrated his address by charts which brought out very clearly every point relating to the apparatus.

George B. Hogaboom followed with an earnest discourse, the subject of which was "Push and Pull," and he outlined how the success of the organization was to be obtained by "Push," and he exhorted platers to become members and help push the industry to a higher plane. He said in part:

> "No man lives unto himself,
> We are but a speck upon speck."

"If we keep to ourselves we are apt to think that we have something different to any other, but some day we run across some work done just the same as ours; it may have been produced right near us, or imported from Japan or other lands. They we commence to realize that we are not the only ones that can do things. In Bohemia they have thirty public schools where they teach electro-plating—in the evening sessions. In Japan they do some splendid work, and in France we find peers in the electro industry. While we may not all be able to go to school, we can all fraternize and educate ourselves in that way. The association will do all that Dr. Jones has said it will do. If you come in you will not regret it."

A social hour followed, in which the guests were introduced to the members, and general good fellowship prevailed. At 11 o'clock the president thanked all who had helped to make the meeting such a success, and thus closed the meeting in due form.

The next regular meeting will be held Friday evening, November 24. Papers will be read by Geo. B. Hogaboom, W. Fischer, James Garde, A. D. Havens, and others.

The regular monthly meeting of the Philadelphia branch of this association was held at Dooner's Hotel, Philadelphia, Pa., October 27. Papers were read by Walter C. Gold, on "Nickel Anodes," and August Heck on "Barrel Plating," samples being exhibited. A dinner and entertainment will be held at the Windsor Hotel on November 18. Several applications for membership were received. Mr. Sturtevant, of the Celluloid Zapon Company, and Mr. McBride, of Trenton, N. J., will speak at the next meeting.

Correspondence

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

NOVEMBER 1, 1911.

There is plenty of activity throughout the metal plants in the Naugatuck valley, and business on the whole is about the same in this part of the country as a year ago, with possibly a slight margin in favor of this year. None of the corporations hereabouts may be said to be pushed, but all are keeping tolerably active and, despite the uneasiness that the enforcement of the Sherman anti-trust law is causing some, there seems to be a sufficiently large influx of orders to indicate that the consumers, at least, are not worrying much about legislation or prosecution. In interviews about the condition of business a week ago several of the Waterbury manufacturers declared that their business at that time was about the same as it was a year ago; some are running on full time and orders are fair. At the Scovill Manufacturing Company's plant, the Chase Rolling Mill Company's, the Waterbury Manufacturing Company's, the Randolph-Clowes Company's and the Bristol Company's offices, conditions were reported to be about the same as in the fall of 1910. The majority of the factories are running full time, and have within 5 or 10 per cent. of their full number of hands at work. The retail merchants complain that business has been dull, but since the middle of October there has been a noticeable increase in activity all through the valley, and even the piano men and others whose business is an index of general progress or prosperity are anticipating a very busy season from now until the first of the new year.

Preparatory to moving its plant to Bridgeport, the heavier products of the Baird Machine Company, of Oakville, are being made with the name "Baird Machine Co., Bridgeport, Conn.," instead of with the old marking. The smaller products of the company, however, are not being changed, and there is a growing belief here that the company will continue for some time to operate a plant in Oakville. Its new plant in Bridgeport is being completed as rapidly as possible, and the change will probably be made before next spring. Official information as to its moving plans is not given out by the company.

Conditions in towns outside of Waterbury are about the same as here. Thomaston's clock and watch shops are keeping busy, but are not pushed. In Waterville the pin shops—they always seem to be prosperous—are running with large forces until 9 p. m., a condition which has been noted since the middle of summer. Oakville's shops are lively. The Blake & Johnson Company, in Waterville, is finding its large new quarters none too large for its present business, and seems certain of a general expansion in all its lines. The Berbecker & Rowland Company is another busy corporation in the Waterville group, and the smaller but none the less busy plant of the Rowbottom Machine Company is growing in importance weekly. Mr. Rowbottom acquired the control of the Manville Bros. Machine Company during the summer, and that there is a bright future in store for his corporation seems to be general opinion hereabouts. Ansonia is enjoying about the same conditions as Waterbury. Its plants are all fairly busy, and here and there there is evidence of the fruits of prosperity such as new additions to factories and general improvements. Derby and Shelton plants are thriving, although the metal industry may be said to be the pacemaker for the other concerns thereabouts.

Torrington's plants are all busy, but the town has had its troubles during the past two months, and they have been heavier than most communities could stand. The scourge of typhoid has been prevalent throughout the borough, owing to the contamination of the borough water supply by summer camping parties that were allowed to pitch their temporary shelters on the border of the watershed. There are upwards of three hundred cases, many of which have recovered, but of which nearly thirty resulted fatally. The factories, with hardly an exception, were among the first institutions to take rigid action against the possibility of contamination, and as soon as it became known that the water supply was contaminated, although it meant a large increase in expense, they installed private supplies, furnished from guaranteed springs or other pure water sources. Some of the factories saw scores of employees stricken down by the disease, and others lost the services of only a few. All the corporations generously contributed to the special relief fund that is being used by the authorities to meet the expenses of doctors and nurses and to provide for the family larders where the heads of the homes are the patients. The disease seems to have been under control for several weeks, for an emergency hospital was promptly fitted up when the State's executive, Governor Simeon E. Baldwin, announced that he could not allow the armory to be used for hospital purposes. The victims were chiefly members of the families of brass workers and other metal trades, followers employed by the Coe Brass Company and other Torrington corporations. Waterbury is getting a new industry, and the old plant of the Blake & Johnson Manufacturing Company on East Main street is being extensively remodeled for the infant industry. It will be a typewriting machine manufactory when completed, and the Acme Typewriter Company will produce its product there. This is a new machine invented by the inventor of the Sholes typewriter.—F. B. F.

NEW BRITAIN, CONN.

NOVEMBER 1, 1911.

That business conditions among the metal working concerns of New Britain are better than they have been in years is evidenced by the fact that two concerns here are having large additions to their factories built, and one is moving into an addition, in reality a new factory, just completed.

The large factory and office building being erected for the Landers, Frary & Clark Company is nearing completion, and when it is finished the concern will have the largest floor space of any of the local factories.

Ground has been broken for a seven-story reinforced concrete addition to the factory of the Russell and Erwin Company, a branch of the American Hardware Corporation, and it is proposed by the officers of the company to push the work on this big addition to the limit.

The National Spring Bed Company have just moved into their new addition and contemplate being in a better position to handle their growing business in the future than in the past.

Persistent rumors have been afloat in New Britain during the past few weeks to the effect that the Corbin Motor Vehicle Company contemplates going out of business before the 1st of January. Speaking to THE METAL INDUSTRY man a few days ago, the president of this company, Charles Glover, said: "There is nothing at all to the story, and I do not understand how it could have started. We could not go out of business if we wanted to on account of the large number of cars sold and as yet undelivered."

The various foremen's clubs in this city, of which there is one with a beautiful clubhouse connected with nearly every large factory, are planning for a busy winter season. Social events of every kind are contemplated, and the clubhouses will no doubt be the center of factory social doings this year as in past winters.

The holiday rush has commenced at many of the factories, and all are working full time. Especially busy is the Landers, Frary & Clark Company, which makes percolators, chafing dishes and other articles adapted for gift purposes.

George M. Landers, ex-Mayor of the city, and president of the North and Judd Company, has taken up his residence in New London, Conn., where he was married a few months ago. He comes to New Britain several times a week to attend to his duties at the North and Judd factory. After serving faithfully for fifteen years as superintendent of the North and Judd factory, William Blair has been forced to resign on account of ill health. He has been succeeded in the position by Martin H. Kenney. A. L. M.

PROVIDENCE, R. I.

NOVEMBER 1, 1911.

The month of October closes with a healthier business feeling than has been the case for several months and with very encouraging prospects for good business for the next few months to come. This is especially the case in connection with the manufacturing jewelry business and the numerous allied trades, while all kinds of metal industries hereabouts are much improved. One thing that has tended to somewhat clarify conditions in the manufacturing jewelry business has been the action of the members of the National Association of Manufacturing Jewelers in rescinding from the vote taken last spring whereby the members were to co-operate with the National Wholesale Jewelers' Association in regulating the dates for showing samples and taking orders. It was proposed that new lines should not be shown before May and December 1, but this rule has been found to be so impracticable that the manufacturers have decided unanimously to reject it and the action leaves all the manufacturers free to show goods and take orders as they may please.

The Pawtucket Foundry Company's property at the corner of Prairie and York avenues, Pawtucket, was sold at public auction a few days ago to Edward Smith, a real estate man of Providence, for $15,000. The sale was held by order of the bankruptcy court through the trustee William H. Thorley, who took charge of the property in that capacity on July 11. Since that time the plant has been closed. Mr. Smith was one of the largest creditors, and after the sale Mr. Thornley said that the price received for the property would just about pay off the indebtedness. There is a $10,000 mortgage on the property, it is alleged. The foundry is well equipped and ready to be put into immediate operation.

Among the recent incorporations under the laws of the State of Rhode Island is that of the Pawtucket Smelting and Refining Company, which was formed for the purpose of smelting, refining and dealing in ores, metals, etc. It has a capital stock of $100,000, divided into shares of $100 each. The incorporators are: Frank L. Hinckley, Rush Sturges and Abbott Phillips, all of this city. John C. Culbert, of the John C. Culbert Company, of Pawtucket, is to be the manager. The Improved Finding Company, a corporation constituted to carry on manufacturing, buying, selling and otherwise dealing in jewelers' findings, recently filed articles of association with the Secretary of State. The incorporators are: Charles H. Griffin, Rudolph G. Schultz and Harold W. Carlisle, all of this city. The concern is to be located in this city and has a capital stock of $50,000. Albert M. Piper has started in the electroplating business at 54 Page street. The co-partnership existing between Thomas S. Jackson and Victor J. Fricker, under the name of Thomas S. Jackson and Company, manufacturing jewelers, at 9 Calender street, has been dissolved by mutual consent. The business will be continued under the same firm style at the same place by Mr. Jackson. The bronze foundry department of the Gorham Manufacturing Company has orders on hand to keep it running at its full capacity for several months. It has recently completed a number of notable pieces and has a number of more partially completed. In the silverware departments the firm is also very busy, among some of the more important work on hand being silver services for three of the United States battleships. W. H. M.

ATTLEBORO, MASS.

NOVEMBER 1, 1911.

Jewelers can remember seasons that promised more than the present one, but there is no tendency to find fault with the present year. Orders are generally fair to excellent; there is plenty of work, and the constant installments of help wanted advertisements in the local paper indicate that there is more work than help. The season thus far seems above the average.

The New England exposition, which closed in Boston at the end of October, witnessed a concerted attempt by the jewelers to impress New England with the importance of the industry that makes the Attleboros and Providence famous. The big display of finished goods filled a big corner in three aisles at the exposition, and attracted many visitors. However, the jewelers learned something about exposition displays, and the next event of the kind will probably find the firms scattered in various parts of the hall and showing processes as well as completed goods. This was the method at the exposition of concerns in other lines which were the winners in impressing their merits on the public.

Edward Newell, formerly connected with the Attleboro Manufacturing Company, has become partner of William E. Richards in the Richards Manufacturing Company. Harold Bigney, manager of the Bristol Manufacturing Company, reports such a rush of orders that he has arranged for a night gang, and keeps the factory going until 10 p. m. The Attleboro Chain and the V. H. Blackington Company have been working overtime in order to catch up with orders.

William H. Bell, of North Attleboro, has been chosen head of the Independent Evening Industrial School which has been opened at the North Attleboro high school. Work has been rushed on another addition for the Watson & Newell Company. The old wooden structure which accommodated the boilers has been removed and will be replaced by a modern brick section.—C. W. D.

NEWARK, N. J.

NOVEMBER 1, 1911.

The manufacturing jewelry trade is opening up pretty good now, the salesmen are bringing better orders from the west and south. The east is a little more conservative and slower to stock up. From now on is the busy season here and the factories will have about all they can do to keep even with the sales. Many of the factories, however, always keep considerable stock made up on hand of staples that do not change.

H. A. Hulslander, 25 North Stockton street, Trenton, has taken up the manufacture of dies and is going out of the line of hammered brass goods.

The new liability law in this state is in force and all employers of labor are responsible for injuries to the people working for them. The insurance companies take their risks but it is said rates have gone up and there has been considerable talk of organizing a mutual insurance company to take care of this class. This is an added cost to manufacturing in any and all lines. It also applies to domestic servants, chauffeurs, etc. It is very trying to the small manufacturer, as the cost of manufacturing has advanced in many directions. Rates have advanced from one to ten per cent.

The Finished Parts Manufacturing Company, of 359 Mulberry street, by their new process of turning out parts of the new white-metal, have large orders on hand and can make twenty at once of any part desired. This metal is harder than brass and softer than steel. This firm have been adding to their equipment and are in the right condition now to do business on a larger scale. William A. Leddell, of Red Bank, N. J., the inventor and late manager of this company, has left the firm and sold his interest, and he may continue in the same line in some way. He still retains the foreign patents but has sold the patents for this country. Frank Cookson is the new foreman of the factory. The New York office is at 32 Broadway.

Ehrlich and Sinnock have got in good shape at their new factory, 126 South street, and have their fall lines ready. The K. Bracher, Jr., Manufacturing Company, of Belleville, N. J., are manufacturing triangles, squares, etc., for jewelers' polishing pinions, polishing wheels, etc.

The Jonathan Bartley Crucible Company, of Trenton, have appointed H. D. Cole as their New England representative.

A. J. Hedges and Company have got in good working order, after moving their jewelry factory from Mechanic street to 178 Emmett street. The Art Metal Works, L. V. Aronson, proprietor, have been constantly adding to their line and output of gold, silver, brass and bronze novelties. The factory is to be enlarged also. H. S.

DETROIT, MICH.

NOVEMBER 1, 1911.

No material change in brass and aluminum has been noted in Detroit during the last month. While all the manufacturing plants in the city are operating, no great amount of work is on hand. Conditions in this line are weak here, the same as it is in other parts of the country. The manufacture of plumbers' supplies, blowpipes and other brass articles has shown no material increase for the last several months. No doubt much of the present dullness is due to the approach of cold weather. This slackness usually follows when building conditions begin to lag in the fall. Then again political conditions are being felt to some extent. Already one begins to hear talk regarding the coming presidential year. There seems to be a general hesitation all along the line.

While Detroit manufacturers are as well fixed so far as business is concerned as other cities, there is no getting around the fact that the future is not as bright as it might be. Unless something unforeseen develops within the next few weeks it is quite evident, with the exception of the automobile end of the business, that the brass and aluminum manufacturing industry will show something of a slump for some time. It is not believed such conditions will last over many months, perhaps not until the beginning of warm weather in the spring.

The automobile business continues at a high water mark, and manufacturers are hustling to fill their 1912 orders. This makes conditions good for brass and aluminum establishments that are employed in the production of automobile parts. Many establishments engaged in other lines of brass manufacture, when business is dull, fall back on the automobile work to keep their plants in operation. Many are doing this now, and no doubt will be compelled to keep it up for some time.

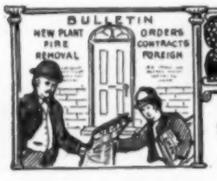
The Ford Motor Car Company has made the announcement that it will manufacture 75,000 cars for the 1912 season. These machines require a great amount of brass and aluminum parts. Many manufacturers of these metals in Detroit will be taxed to handle the large orders that will come from this establishment. The campaign already in on. The Ford plant is running right up to the limit, and will take on a large force of men when the new addition to the factory is completed. The E-M-F factories, controlled by the Studebaker corporation, also is planning to manufacture a greater number of machines than ever before. Additions are being erected to two of its big plants here. The company announces that it will expend $1,500,000 on improvements in the way of buildings and machinery.

The Hudson Motor Car Company, like the other big automobile plants here, is spending nearly $1,000,000 for new buildings and equipment. This company is expanding for the purpose of increasing its 1912 output. It also will add largely to its force when additions to its plant are completed, which will be some time about the first of the year.

The Herreshoff Motor Company is another automobile establishment in Detroit that is spending over $1,000,000 for a new factory which it is erecting on Woodward avenue, in the vicinity of Highland Park. This structure is located in the heart of the residence section, and is being constructed in such a manner as not to detract from the surroundings. Several thousand men will be employed here when it is completed, which probably will be some time after the first of the year.

One of the largest shipments of automobiles on record was made from the E-M-F plant of the Studebaker Corporation in this city one day during the last month. It consisted of 53 fully loaded freight cars of automobiles, which were sent over the Wabash to Kansas City. The value of the entire train load was $300,000.

Garlick & Runnels, of Saginaw, Mich., a firm recently organized for the manufacture of jewelry and for gold and silver engraving, have engaged quarters in the Wiechmann building, in that city, and machinery and equipment will be installed for the employment of ten mechanics. This is distinctly a new industry for Saginaw. The firm is composed of E. T. Garlick, formerly of Birmingham, Eng., and for the last two years with the Stolz jewelry establishment of Saginaw, and L. E. Runnels, of Wright, Kay & Company, of Detroit. The company will solicit the trade in Saginaw and northern Michigan.—F. J. H.



TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

J. W. Buckley, Dalton, Mass., has fitted up a foundry for the purpose of making brass, bronze and aluminum castings.

The current trade press reports that the Standard Silver Plate Company, Toronto, Ontario, will build a factory to cost $75,000.

It is reported that The Northern Welding & Galvanizing Company, Minneapolis, Minn., will spend $10,000 for a frame addition to its plant.

The Mast Lightning Rod Company, of West Milton, Ohio, has recently been formed to manufacture the latest improved lightning rods, fixtures and ornaments.

The Standard Machinery Company of Providence, R. I., is running day and night, having captured some Government orders, which with their usual work has kept their shops very busy.

A life-size bronze statue of Andrew Carnegie will be erected in the foyer of the music hall in the Carnegie Institute, Pittsburgh, Pa., as a tribute from his former junior partners in the steel business.

The Munro-Eastwood Pin Company, New Britain, Conn., have installed a complete plating department, and are preparing to take contracts for outside work as well as doing all of their own plating.

The Pelton Water Wheel Company, hydraulic engineers, New York, announce that they intend to build a small factory in connection with their plant at Harrisburg, Pa., and later expect to make brass castings.

The National Smelting Company, 5301 Sweeney avenue, Cleveland, Ohio, which was recently organized under the laws of the State of Ohio, have equipped their plant to manufacture high-grade aluminum ingots.

The Cleveland Pneumatic Tool Company, Cleveland, Ohio, are erecting a new stock room 50 by 50 ft. The removal of stock to the new building from the present plant will provide additional room for manufacturing purposes.

The Canadian Jewelers, Ltd., 7 Bleury street, Montreal, Canada, have amalgamated the following firms: Hemming Manufacturing Company, William Bramley, Hemsley Manufacturing Company, Montreal, and J. E. Brown & Co. of Toronto.

The Abbott Ball Company, manufacturers of steel balls for burnishing metal goods and the Abbott tumbling barrel, Hart-

ford, Conn., will erect a factory at Elmwood, Conn., 40 by 100 feet, two stories. The building will be of brick and steel construction.

Merchant & Evans Company, 517 Arch street, Philadelphia, Pa., announce that they have already closed contracts for equipping approximately 2,000 motor trucks with the Hele-Shaw clutch for the season of 1912. They report continued success with this clutch.

The New Era Lustre Company, New Haven, Conn., report that, despite the prevailing increased prices for all kinds of lacquers, they are working nights and Sundays to take care of their growing business. They are putting up an addition to their factory which will double their working area.

The Gorham Manufacturing Company, Providence, R. I., has recently cast some notable bronze statues, among which are the statue of William Cullen Bryant, which was unveiled in Bryant Park, New York, last month; a heroic statue of John Paul Jones and two large figures for the Boston Public Library.

The Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y., announces the opening of a New York office in the Flatiron building, Broadway and 23rd street. The office, which was established owing to the company's increasing business in the vicinity of New York, will be in charge of James E. Barkley.

The Geometric Tool Company, manufacturers of special machinery and tools, New Haven, Conn., report an excellent demand during the past year for their die holders, tools, etc. The product of this concern is specially adapted for use in brass working machine shops, and such concerns will find their catalogue of interest.

The Sumter Telephone Manufacturing Company, Inc., manufacturers of telephones, switchboards and telephone appliances, Sumter, S. C., are contemplating the installation of a brass foundry. This concern has considerable difficulty in getting supplies of brass castings promptly, as their plant is quite a distance from the nearest brass foundry.

Davenport and Keeler, 214 Main street, New Britain, Conn., whose well-known laboratory is patronized by many metal concerns, advise us that they have recently added to their equipment and are better prepared than ever to do analysis and testing very promptly. At the present time, they particularly desire orders for physical tests of metals, etc.

C. W. Leavitt & Co., 30 Church street, New York, are pushing "H. H." brand of French antimony, guaranteed 99 per cent. The Leavitt people say that the "H. H." brand is made by one of the largest refiners in the world, and that they are enabled to deliver a high grade metal at a low price, owing to the control of their own mines and a very large output.

The Slade Manufacturing Company have now become established in a factory building at 72 Bates street, Providence, R. I., where they have two floors of a structure 100 by 50 feet. The company is drawing brass and copper tubing of 3/8-inch O. D. and smaller, chiefly for the automobile trade. The officers of the company are Joseph Slade, president, George F. Slade, treasurer.

The Miner & Peck Manufacturing Company, New Haven, Conn., report that they have been busy all the year, at one time having difficulty in filling their orders, and recently received an order for a drop press from Canada, to which country they have supplied many of their drops, showing that reciprocity or no reciprocity, the Canadians need American machinery.

The New Era Lustre Company, New Haven, Conn., are branching out in their manufacture of lacquers by the making of a line of enamels for the ornamental coating of metals. They are also producing a Japan lacquer for automobile lamps. The enamels they produce can be applied to most all substances and give either a glaze finish, which is readily cleaned or an artistic one, which is very presentable.

The New Haven Sand Blast Company, New Haven, Conn., are making self-contained sand blast tumbling barrels, about twenty of which have been installed in prominent metal goods establishments throughout the country. This is a new apparatus, the makers of which seem to have solved many of the difficulties heretofore met with in producing a tumbling barrel in which the effects of both tumbling and sand blasting are secured.

Alcodeo is the name of a new solvent now being introduced by the Anderson Chemical Company, 92 William street, New York, as a substitute, for certain purposes, for amyl acetate. In soluble cotton it is said to produce an absolutely clear, water-white film, and several prominent brass mills are now trying it out commercially on a large scale. In banana liquid it has proven very satisfactory, and other uses for it are being developed.

It is announced in the daily press that the H. Mueller Manufacturing Company, Decatur, Ill., have decided to locate their Canadian plant at Port Arthur, Ontario, announcement concerning which plant was made in the October number of THE METAL INDUSTRY. The reported agreement proposes that the city grant the company a block of land valued at $20,000, free of taxation, and to erect a building costing $40,000. Title to the property will pass to the company after it has paid $600,000 in wages.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., December 5, 1911, and publicly opened immediately thereafter, to furnish at the navy yard, Mare Island, Cal., a quantity of naval supplies, as follows: Sch. 4,065, brass, commercial bar, 25,600 lbs.; brass, sheet, 12,650 lbs.; copper, sheet, 13,000 lbs.; sch. 4,062, bronze, naval, rod; solder, half-and-half, 3,500 lbs. At the navy yard, Puget Sound, Wash.: Sch. 4,062, copper, ingot, 40,000 lbs.

The New Haven Sherardizing Company, New Haven, Conn., are making considerable progress in the process of vapor zincing, known as sherardizing. This process was first described in THE METAL INDUSTRY in August, 1904, and, as is now generally known, consists of vaporizing zinc in iron drums, which vapor is absorbed by the iron articles placed in the drums. The company are now zincing pulleys, chains, nails, gun-rods, and various other classes of goods which are produced by the large hardware manufacturers of the country. A. F. Schoen is now manager of the New Haven sherardizing plant.

The New Britain Testing Laboratory, under the direction of William Hasselkus, consulting engineer, has been established at 214 Main street, New Britain, Conn. This laboratory will make a specialty of physical tests, chemical analysis, photomicrography, and do designing and drawing. They have installed a fine Riehle testing machine with capacity of 100,000 pounds, and also a thoroughly up-to-date equipment for making photomicrographs, and doing all kinds of chemical analysis. They invite concerns who desire to have their raw material or finished products analyzed and tested to correspond with them.

The motor boat Dixie IV, winner of the 1911 international championship, was equipped with an engine having bearings of Parsons' White Brass, which was furnished by William Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa. Frederick K. Burnham, one of the owners of the boat, recently advised the Cramp company that the bearings are still in the engine, and are giving perfect satisfaction in every respect, after having gone through over 51,000,000 revolutions of the engine. Mr. Burnham states

that for motor boat purposes he cannot recommend Parsons' White Brass bearings too highly.

The Aluminum Specialties Manufacturing Company, Fulton, N. Y., successors to the Utica Aluminum and Novelty Works of Utica, N. Y., report through M. L. White, the manager, that they have recently purchased a large new plant which gives them ample manufacturing facilities. They have greatly increased the capitalization and added to the machinery equipment, which places them in position to give better service than ever before. He states that the business has increased very rapidly, and exceeded their previous business for the last six months by at least 60 per cent., while last year's business was over 50 per cent. above that of the preceding year.

The United States Government has made arrangements with the Commercial Bureau Company, of 50 Church street, New York City, whereby American consulates will be equipped with card index files of all lines of manufactures. This will give foreign buyers an opportunity to get what they are looking for. Previously this has been done by catalogues, which were printed in English, but the card index will be printed in several languages. Every manufacturer should send to the bureau such information as will interest foreign buyers. There is no charge for the service whatever. These will be kept on file at every consulate of the United States Government.

It is not every brass mill that has monkey visitors, but such a distinction was thrust, during the past month, upon the Manhattan Brass Company of New York, when a Rhesus monkey escaped from the Cornell Medical College at Twenty-eighth street and Second avenue, and first jumped on to a picket fence and then on to the back of an astonished laborer in the yard, and from there into the coal bins, where it disappeared. A careful search and re-search failed to find the monkey, which bore the distinguished name of Iphigenia, and which the college authorities had planned to inoculate with the germs of infantile paralysis. No doubt if Superintendent Newett had found Iphigenia he would have put the monk into service as a roller, thereby saving the primate from a germ death.

The American Brass and Iron Company, manufacturers of brass goods for steam, water and gas, Detroit, Mich., are now erecting a brass and aluminum foundry 35 by 80 ft., which will triple their present capacity. The company state that the building will be of regular monitor type construction, with steel arches and of solid brick. There will be large windows, both in the walls and in the monitor, giving a maximum of light and air. Part of the structure will be reserved for storage of coke, sand, charcoal, etc., so that these articles will be under cover at all times. Adjoining the foundry proper will be a large metal and pattern vault, which will be equipped with concrete floor and roof, as well as solid steel door, making it absolutely fire and burglar proof. Every convenience leading to the comfort of the workmen will be installed. The furnace equipment is being supplied by the J. D. Smith Foundry Supply Company, Cleveland, Ohio. The company expect to occupy this new building about December 1, and will then be in a position to take on additional orders for brass, bronze and aluminum castings, as well as all kinds of machined cast brass and aluminum work..

BRASS IN HONOLULU.

A tourist to the city of Honolulu in the Hawaiian Islands is surprised to find in this far-away corner of the Pacific a brass foundry making castings weighing from 6,000 to 7,000 pounds. The foundry in question is a part of the plant of the Honolulu Iron Works Company, which manufactures sugar machinery for all of the sugar producing countries of the world, and certain parts of this sugar machinery require huge brass castings, and also brass and copper tube and sheet in various thicknesses and gauges. The Honolulu company also do considerable local work, both marine and land, having a plant capable of turning out all kinds of iron and brass work used in machinery. Their foundry is a substantial building, 300 by 90 feet; their machine and boiler shop is of the same size. They are equipped with five 15-ton electric cranes, one 3-ton and other modern machinery for handling their products. The plant of the Honolulu Iron Works Company is busy all the year round. The officers are: General manager, C. Hederman; assistant general manager, J. W. Dyer; shop superintendent, R. Scott.

Another Honolulu plant which casts and finishes brass, though on a smaller scale than the first works mentioned, is the Cattan-Neale Company. Both plants noted are at present doing a brisk business, with a prospect of extension as the Hawaiian Islands increase in population and commercial importance.

BUSINESS TROUBLES

The Enos Company, manufacturers of gas and electric light fixtures, with factory at Seventh avenue and Sixteenth street, and showrooms at 36 West Thirty-seventh street, New York, have filed a petition in bankruptcy in the United States District Court, estimating liabilities at $431,524 and assets at $675,571. The business will be continued by the receivers, Charles L. Gulick and Archibald Douglas, who were appointed with bonds of $100,000 each.

A petition asking for the appointment of a receiver for the Pittsburgh Lamp, Brass and Glass Company, Pittsburgh, Pa., was granted by the court, Frank G. Wallace being appointed receiver, bond being fixed at $100,000. The petitioner stated that he was informed the cash on hand had been reduced to about $40,000, and that bills payable and ledger accounts amounted to $620,000. The capital stock of the company is $1,500,000, one-half of which is preferred and one-half common stock. The petition declares that the annual statement of the company, issued January 1, 1911, showed assets of $3,601,490.41, and liabilities of the same amount.. Daniel Taylor, president, and Lee A. Lyman, treasurer, admitted the statement to be correct.

CHANGE IN FIRMS

E. E. Swalley, Birmingham, Ala., has taken over the Birmingham Plating Company, where he will do all classes of plating, polishing, lacquering, and manufacture names plates, under the name of the E. E. Swalley Plating Company. Mr. Swalley is making improvements to the plant, which is located at 217 North 40th street.

The firm of the Onondaga Brass Company, manufacturers of brass, bronze, aluminum and silver metal castings, Syracuse, N. Y., has been incorporated for the purpose of protecting the firm name. No change will be made in the management or personnel of the company, which consists of Henry Mahley, L. F. Meagley and J. A. Underdown. The company does not contemplate making any purchases of machinery at present.

REMOVALS

The office of A. Eugene Michel and staff, advertising engineers, has been moved into the Park Row building, 21 Park Row, New York, where larger space has been secured as necessitated by constantly increasing business.

The Bennett-O'Connell Company, manufacturers of complete electroplating and polishing equipments, platers' chemicals, etc., Chicago, Ill., have moved their general offices and factory to 3600-3604 South Morgan street, but still maintain city office and store room at the old address, 15-17 South Clinton street.

FIRES

The four-story brick factory of the Holtzer-Cabot Electrical Company, manufacturers of electrical machinery, Brookline, Mass., was almost totally destroyed by fire October 7. The total loss is conservatively estimated at $150,000.

The Eureka Foundry and the Strickland Pattern Works, Chattanooga, Tenn., were destroyed by fire on October 7.

The machinery, patterns and buildings of the Eureka Foundry total a loss of about $30,000, about one-half of which is insured. The Strickland Pattern Works, which was valued at $5,500, carried insurance to the amount of $1,600.

INCREASE OF CAPITAL STOCK

The Kokomo Brass Works, Kokomo, Indiana, have increased their capital stock from $50,000 to $100,000.

INCORPORATIONS

West Bend Aluminum Company, West Bend, Wis. Capital stock, $14,000.

The E. M. Burr Company, Champaign, Ill. Capital stock, $100,000. To carry on a general foundry and machine shop business. Incorporators: E. M. Burr, Nancy G. Burr and Manford Savage.

PRINTED MATTER

Testing Machines: Henry Souther, consulting engineer, 11 Laurel street, Hartford, Conn., has sent out a card which contains the table of Brinell hardness numerals.

Electroplating Machines: Rockhill & Vietor, dealers in electroplating machinery, New York, have issued a folder giving some very valuable points of information regarding their celebrated "None-such" electroplating machine. This machine was completely illustrated and described in The Metal Industry for September, 1910.

Burnishing: The Abbott Ball Company, manufacturers of ball polishing barrels, Hartford, Conn., describe their burnishing process by means of steel balls in a small booklet just issued. The Abbott burnishing apparatus is also fully described in this booklet and directions are given for the complete operation of polishing by means of their process.

Sand Blasts: The Thomas W. Pangborn Company, Jersey City, N. J., have issued a post card folder in the interests of their Pangborn sand blast. It is claimed by the company that the Pangborn high pressure sand blast is eminently superior to the tumbling barrel process for the finishing of metal goods. The folder contains a number of flattering testimonials regarding the performance of the sand blast.

Polishing Wheels: A trade catalogue de luxe has been issued by The Divine Brothers Company, Utica, N. Y., manufacturers of apparatus for buffing and polishing of metals. This catalogue, issued under date of July 1, consists of 64 pages and is devoted to the description of compress and all other polishing wheels known to the trade. The catalogue is printed on heavy surface coated paper and is handsomely illustrated with high grade halftone cuts in colors. The descriptions of the various kinds of wheels are clear and concise and these, together with the price list and tables, make it extremely valuable to the user of polishing and buffing wheels. Copies of the catalogue may be obtained upon request.

Dynamos: The Bennett-O'Connell Company, manufacturers of electroplaters' supplies, Chicago, Ill., have issued Bulletin No. 108, giving full description of their well-known "Excell-All" dynamos. These dynamos, as were fully described in The Metal Industry, October, 1911, are fully explained in the bulletin. Among other things contained in the bulletin are the line of anodes handled by this company which include flat, diamond and elliptic, which are made from pure Canadian grain nickel and guaranteed as to composition. An interesting illustration on the back cover shows in a simple practical way to connect dynamos to the main conductors from the plating dynamo. Copies of the bulletin may be obtained upon request.

Chemicals: The Niagara Alkali Company, manufacturers of electrolytic caustic potash, muriatic acid and by-products, Niagara Falls, N. Y., have issued a 26-page pamphlet, giving description of their plant and facilities for manufacturing the various chemicals which they put on the market, included among other products for which they have processes and apparatus in the course of development are carbon tetrachloride, tin chloride (fuming and solid), potassium chlorate, zinc chloride, chloroform, bromine, pure carbon black, Prussian and Paris blue, sulphur chloride and other chlorine products, caustic soda, Robert's liquid potash, liquid chlorine, liquid bleach, bleaching powder, muriatic acid (arsenic free), etc. The trade mark shown in the illustration has just been registered by the company in the United States Patent Office, under number 83,850, October 17, 1911. This trade mark NIAGALK, the company say, will stand in the future for pure 90 per cent. caustic potash.

CATALOGUE EXHIBIT

An exhibition of every kind of catalogue may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogues, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

AD NEWS

The Paige Retort and Crucible Company, Taunton, Mass., continue their series of ads calling attention to the merits of their products.

The Standard Supply Company, New Haven, Conn., advertise platers' compound for the removal of buffing dirt. This compound has been on the market for 26 years.

Leiman Brothers, 62-J John street, New York, this month feature their sand blasts for producing a satin finish, etc., and also Leiman pressure blowers and vacuum pumps.

Fitz, Dana & Company, Boston Mass., whose large facilities for furnishing metals of all kinds are taken advantage of by many foundrymen, again have their advertisement on the front cover.

The Balbach Smelting and Refining Company, Newark, N. J., advertise in this issue their facilities for handling residues containing copper in any form in accordance with the most modern practices.

The Peck Drop Press Works, New Haven, Conn., tell in their advertisement how much more economical it is to operate drop presses with the Peck automatic drop lifter than by old methods. Peck drop presses and lifters are thoroughly well known, particularly in the silverware trade.

R. F. Lang, 31 Broadway, New York, calls attention to his guaranteed 10 and 15 per cent. Royal manganese copper for making manganese bronzes, also to Royal phosphor tin, Royal silicon copper and Ferrool Hocksit, the only hard solder for cast iron. Booklet "M N" gives full particulars.

The advertisement of John C. Wiarda & Company, 263 Green street, Brooklyn, N. Y., on another page lists some of the specialties manufactured by them for the metal trades. Nickel, brass, copper and zinc anodes head the list which includes also nickel salts, cyanide of potassium, caustic potash, in fact nearly all chemicals used by platers and metal goods manufacturers. The company also makes chemical lead tanks and other acid-resisting containers. Their three manufacturing plants in Brooklyn, N. Y., and Glastonbury, Conn., cover large areas, and in their warehouses are carried enormous stocks of their various products. In some of the lines mentioned above they are the largest producers in the United States.

METAL MARKET REVIEW

NEW YORK, November 6, 1911.

COPPER.

The only feature to note in the copper market for the month was the remarkable steadiness in the face of constant declines in prices of iron and steel products, and the general feeling of unrest all over the country. The trade in copper has been fairly good and prices today are unchanged from a month ago. Lake is quotable at 12½, electrolytic 12¼, and casting brands at 12.15.

The exports for the month were only 21,904 tons, against 27,917 tons for the same month last year. According to the foreign statistics the total visible supply in England and France decreased some 2,580 longs tons, or about 5,800,000 pounds for the fortnight, making a total decrease of the stocks in England and France for the month 12½ million pounds, while the stocks in Rotterdam and Hamburg decreased about 800 tons.

The consumption of copper abroad, especially in Germany, continues very good, and increased exports are predicted for the coming month.

The London speculative market has not been very active and prices at the close are about 10s. per ton above those ruling a month ago.

TIN.

The consumption of tin during the month has been fairly good; 3,500 tons as reported by the New York Metal Exchange. Prices have followed the ups and downs of the speculative London market. Opening at around 40 cents, prices advanced to a few points over 42 cents and closed at 41.65, showing an advance for the month of about 1½ cents.

Statistically the market is in very good shape, the total visible supply today being 2,500 tons less than a month ago; this should help the bull syndicate to still further keep control and manipulate prices. But for the far-off futures, the change in the tin rules on the London Metal Exchange may interfere somewhat with the plans of the syndicate, but up to January next the market is likely to be controlled absolutely by the bull crowd that has been so far able to just about put the prices wherever they felt like.

Spot tin is quotable today at around 41½ cents; futures a few cents lower.

The London market shows an advance for the month of about £10 per ton. It has been quite impossible to account for or to forecast any of the erratic movements in the London market; consumers had to pay the price or go without.

LEAD.

The price of lead has been reduced ¼ cent per pound during the month by the leading interest and the rest of the market had to follow suit. From 4½, 4.55 at the opening prices today are 4¼ New York to 4.30 for carload lots.

SPELTER.

The spelter market continues to be manipulated by the same crowd that has had control for some months. The St. Louis exchange is used at one end of the line and the New York Metal Exchange at the other, and consumers are made to pay whatever price the "combine" agrees on. The market today in St. Louis is quoted strong at 6¼, and the New York price is 6.40.

ALUMINUM.

The aluminum market is easier at around 18½ to 18¾ for future delivery round lots, while the spot market is quotable at 19 cents for 5-ton lots to 19½ for smaller lots.

ANTIMONY.

Prices are a shade lower again. Cookson's at 8 cents, Halletts at 7¾, Chinese and Hungarian grade at from 6.90 to 7 cents for round lots.

SILVER.

The silver market has been stronger and prices have advanced about 2 cents per ounce in New York and nearly 1d. per ounce in London. Closing at 54⅜ New York and 25 1/16 London.

QUICKSILVER.

The market has been a shade quieter, with prices about the same as a month ago. Wholesale lots $46 per flask, jobbing lots $46.50 to $47.00.

PLATINUM.

The market has been steady at the advance of a months ago. Hard at $48.50 and ordinary refined at $46.00. Iridium is quotable at $64.50.

SHEET METALS.

Sheet copper is quotable at 16½ base and wire nominal at 13¼ to 13½. Copper clad wire at 13 cents base. Brass products: A new list has been issued from November 1.

OLD METALS.

There has been a good foreign demand and more enquiry from home consumers, but the margins of profit seem to be cut to less than nothing. Prices are about the same as a month ago.

J. J. A.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	November 8, 1911.
Stocks of marketable copper of all kinds on hand at all points in the United States, October 1, 1911	140,894,856
Production of marketable copper in the United States from all domestic and foreign sources during October, 1911	118,255,442
	259,150,298
Deliveries:	
For domestic consumption	64,068,307
For export	60,084,349
	124,152,656
Stocks of marketable copper of all kinds on hand at all points in the United States, November 1. 1911	134,997,642
Stocks decreased during the month of October	5,897,214

OCTOBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	12.60	12.35	12.50
Electrolytic	12.50	12.25	12.40
Casting	12.35	12.15	12.25
TIN	42.00	40.00	41.25
LEAD	4.55	4.25	4.35
SPELTER	6.40	6.10	6.25
ANTIMONY (Hallett's)	7.75	7.65	7.70
SILVER	.54⅝	.52⅜	53.35

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1910—Average for year 13.13½. 1911—January, 12⅞; February, 12¾; March, 12½; April, 12½; May, 12⅝; June, 12⅝; July, 12¾; August, 12¾; September, 12⅝; October, 12½.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

Metal Prices, November 6, 1911

NEW METALS.	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	12.50
Electrolytic, carload lots	12.25
Casting, carload lots	12.15
TIN—Duty Free.	
Straits of Malacca, carload lots	41.50
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.30
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western carload lots	6.40
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	19.25
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.00
Hallett's cask lots	7.75
Chinese	7.00
Hungarian grade	7.00
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots, Blocks according to quantity	.43 to .60
MANGANESE METAL—Duty 20 per cent.	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad val.	.98
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.52¾
PLATINUM—Duty free	46.50
QUICKSILVER—Duty 7c. per lb. Price per pound	.65

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
10.50 to 10.75	Heavy Cut Copper	11.75 to 12.00
10.25 to 10.50	Copper Wire	11.25 to 11.50
9.50 to 9.75	Light Copper	10.50 to 10.75
9.25 to 9.50	Heavy Mach. Comp.	10.50 to 10.75
7.00 to 7.25	Heavy Brass	8.00 to 8.25
5.50 to 5.75	Light Brass	6.50 to 6.75
7.00 to 7.25	No. 1 Yellow Brass Turnings	7.75 to 8.00
7.75 to 8.00	No. 1 Comp. Turnings	8.50 to 9.00
3.90 to 4.00	Heavy Lead	—— to 4.25
3.75 to 3.90	Zinc Scrap	—— to 4.25
5.00 to 5.50	Scrap Aluminum, turnings	6.00 to 7.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.50
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

INGOT METALS.			Price per lb. Cents.
Silicon Copper, 10% to 20%	according to quantity		28 to 35
Silicon Copper, 30% guaranteed	"	"	38
Phosphor Copper, 5%	"	"	19 to 21
Phosphor Copper, 10% to 15%, guaranteed	"	"	28 to 30
Manganese Copper, 30%	"	"	30 to 35
Phosphor Tin	"	"	34 to 36
Brass Ingot, Yellow	"	"	8½ to 9½
Brass Ingot, Red	"	"	11 to 12½
Bronze Ingot	"	"	10 to 11
Manganese Bronze	"	"	17 to 19
Phosphor Bronze	"	"	13 to 16
Casting Aluminum Alloys	"	"	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 16.50 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper:								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from ..... 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ¾ inch diameter or over ..... Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1⅝c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	8.00 less 8%
Casks, jobbers' prices	8.50
Open casks, jobbers' prices	9.00

Metal Prices, November 6, 1911

PRICES ON BRASS MATERIAL—MILL SHIPMENTS,

In effect November 1, 1911, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13⅝	$0.14¾	$0.15⅞
Wire	.13⅝	.14¾	.15⅞
Rod	.13⅝	.15½	.16⅞
Brazed tubing	.18½	—	.20⅝
Open seam tubing	.16½	—	.18⅝
Angles and channels, plain	.16¾	—	.18⅝

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass...	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14⅝	$0.15⅝	$0.16⅞
Wire	.14½	.15⅝	.16⅞
Rod	.14½	.16½	.17⅞
Brazed tubing	.18⅞	—	.21⅝
Open seam tubing	.17½	—	.19⅝
Angles and channels, plain	.17¾	—	.19⅝

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass..	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

13.50 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	17½c.	per lb. base
100 lbs. to 300 lbs. in one order	18c.	" " "
Less than 100 lbs. in one order	19½c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 55 and 5%.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod		16c.	net base
Munts or Yellow Metal	Sheathing (14" x 48")	14c.	" "
" " "	Rectangular sheets other than Sheathing	16c.	" "
" " "	Rod	14c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 22⅝c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than.....	3in.	6in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.
	and including.....	12in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.	40in.
		in coils.								
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	69	72	77
" 31		43	47	55	58	63	71	74	77	83
" 32		45	49	57	61	69	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	57
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	70	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S.G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19, B. & S. Gauge,	inclusive	$0.60
6	"	"	19, "	"	.70
9	"	"	19, "	"	.85
12	"	"	19, "	"	1.00
15	"	"	19, "	"	1.15
16	"	"	19, "	"	1.20
18	"	"	19, "	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.

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FOR SALE—GAS PRODUCER ENGINE. A 105 h.p. "Otto" gas producer engine with dynamo and switchboard and electrical equipment complete. Erected one year ago. No expense was spared to make it a model installation. Particulars and description can be found on page 120 of March number of THE METAL INDUSTRY, or can be inspected upon application. THOMAS A. PAINTER, 79 Eighth avenue, New York, N. Y.

FOR SALE—Dings No. 2, Type M. Electro Mag. Separator (second hand) for 110 or 220 volts D. C. Good as new. Cost $260. Price $200. J. W. PAXSON CO., Philadelphia, Pa.

FOR SALE—Opportunity: Brass tubing; 1 inch, 18 B. W. G., 500 lbs. Suitable for electric portables, gas fixtures. H. F. FRASSE, P. O. Box 801, Brooklyn, N. Y.

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FOR SALE—BRASS FINISHING and SCREW MACHINE SHOP. Fully equipped, good trade, exceptional return on investment for practical man. Owner has other interests. Reasonable price and terms. Chance of lifetime for some one. Address BRASS MACHINE SHOP, care THE METAL INDUSTRY.

FOR SALE OR LEASE—BRASS AND ALUMINUM FOUNDRY in Indianapolis, Ind. Thoroughly modern in equipment and appliances. Did a business in its last year of nearly $200,000.00. Second largest automobile center in United States. Nearly thirty auto factories in city and vicinity. Great quantities of brass and aluminum castings required here and within a radius of one hundred miles. Present owner engaged in other business requiring his time. Address F. E. JANES, care F. E. JANES COAL & GRAIN COMPANY, INDIANAPOLIS, IND.

FOR SALE—BRASS FOUNDRY doing green sand and all classes fine work, fully equipped with large oven, electric motor, power sprue cutter, air compressor, molding machine, lifting and carrying devices, etc. Excellent chance for foundryman or manufacturer adding finishing department. Best location, manufacturing district of New York City. Light loft 40 x 90 feet with valuable lease for six years. Sacrifice for $2,500 cash. Address FINE WORK, care THE METAL INDUSTRY.

FOR SALE—PLATING and POLISHING SHOP, the only one in city. At the present time doing good business. Reason for selling, other business. Cheap to quick buyer. Address PLATING SHOP, care THE METAL INDUSTRY.

FOR SALE—BRASS FOUNDRY in Brooklyn, N. Y., fully equipped and running at the present time. Good line of paying business. Owner engaged in other business requiring his time. Address X Y Z, care THE METAL INDUSTRY.

FOR SALE—Good paying BRASS MANUFACTURING ORNAMENTAL METAL and PLATING WORKS; fully equipped; long lease; cheap rent; established thirty years; wants to sell on account of sickness; will sacrifice for $9,000, at least half cash. Address BOX 1, care THE METAL INDUSTRY.

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WANTED—A 10 h. p. UPRIGHT BOILER. Must be in good condition and at low cost. Address S-1, care THE METAL INDUSTRY.

WANTED—Second-hand 6 or 8 h. p. horizontal engine and boiler. State what make, condition and price. Address HORIZONTAL, care THE METAL INDUSTRY.

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WANTED—The Agency for some American Hardware firms in England. Address HARDWARE, care THE METAL INDUSTRY.

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INQUIRIES

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY. No charge for inserting these inquiries.

Inquiry No. 379—We would like to correspond with firms that are melters of aluminum in ingot form.

Inquiry No. 380.—We would like to correspond with manufacturers of grooved core boxes for foundry purposes.

Inquiry No. 381—We would like to correspond with firms who make nozzles for a sand machine.

Inquiry No. 382.—We would like to correspond with firms that make automatic grinding and polishing machines to be used on pliers of every description and other small tools.

Inquiry No. 383—We would like to correspond with firms making gasoline blow torches for soldering, brazing, burning off paint, etc.

Inquiry No. 384.—We would like to correspond with the rollers of thin sheet copper, silver plated.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES

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INQUIRIES—Continued

Inquiry No. 385—We would like to correspond with firms located near Philadelphia who would buy tin drosses.

Inquiry No. 386—We would like to correspond with firms from whom we can buy our requirements in crude potash.

Inquiry No. 387—We would like to correspond with firms making stamped brass hinges about 3 inches long x 2 inches wide for interior wood work.

Inquiry No. 388—We would like to correspond with the manufacturer of charcoal iron electric sheet.

Inquiry No. 389—We would like to correspond with the maker of anti-acid solution for soldering metals.

SITUATIONS OPEN

EXECUTIVE

WANTED—BY MANUFACTURER OF AUTOMOBILE SPECIALTY, BRIGHT YOUNG MAN IN INSPECTION DEPARTMENT FOR PURCHASED GOODS. SHOULD HAVE TECHNICAL EDUCATION, ACTUAL SHOP EXPERIENCE, AND MUST BE FAIR CORRESPONDENT. MAN WITH SOME FOUNDRY EXPERIENCE PREFERRED. STATE AGE, NATIONALITY, EXPERIENCE AND SALARY EXPECTED. P. O. BOX NO. 22, BRIGHTWOOD, MASS.

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WANTED—METAL FOREMAN experienced in handling men and capable of drawing steel No. 24 U. S. and No. 28 U. S., and familiar with machine and hand spinning. State full particulars and give reference. Excellent opportunity for a thorough mechanic who can produce results. Address MACHINE SPINNING, care THE METAL INDUSTRY.

WANTED—PRESS DEPARTMENT FOREMAN. A mechanic who thoroughly understands the operating and capacity of single and double acting drawing presses. Must have a good knowledge of the operating and handling of dies for forming light gauge metal. Plant is small, but growing rapidly. An excellent opportunity. Address DRAWING PRESSES, care THE METAL INDUSTRY.

FOUNDERS

WANTED—First-class foreman for brass foundry. Must have had experience with manganese bronze and compositions. Apply at once. Address NORMAN, care THE METAL INDUSTRY.

WANTED—FOREMAN BRASS MOLDER, for position in Toronto; experienced in Engineers', Plumbers'and Chandelier Brass Work; also thoroughly conversant in mixing of Metals. Apply, stating Experience and Salary, CHANDELIER, care THE METAL INDUSTRY.

WANTED—An experienced BRASS MOLDER, capable of acting as FOUNDRY FOREMAN in a plant manufacturing plumbing and steam goods. Must be young, energetic and capable of handling men. State age, experience, reference and salary wanted. Address B. & I. WORKS, care THE METAL INDUSTRY.

DIE CASTER

WANTED—A MANAGING SUPERINTENDENT capable of taking complete charge of a DIE CASTING PLANT in CANADA, preferably one who can become interested financially and act as director. Address CANADA MANAGER, care THE METAL INDUSTRY.

SITUATIONS WANTED

Advertisements Under This Heading 50 Cents Each Insertion.

EXECUTIVE

SITUATION WANTED—ARCHITECTURAL BRONZE and IRON—Am thoroughly conversant with the handling of architectural bronze in all its branches from prospect to complete installation. First class working knowledge of Estimating, Drafting, Manufacture and Simple System. Would like to locate permanently in a responsible position with up-to-date concern requiring the service of one who can deliver. Address R. H. T., care THE METAL INDUSTRY.

SITUATION WANTED—By an Expert Cost Accountant, Cashier, Paymaster, also Purchasing Agent. Have had eight years' experience with one of the leading plating supply houses, both in office and as salesman. Can furnish the best of references. Address EXPERT ACCOUNTANT, care THE METAL INDUSTRY.

EXECUTIVE—Continued

SITUATION WANTED—I am desirous of making a change in September. For the past four years I have been GENERAL MANAGER of a leading plant making PLUMBING SUPPLIES, and previous seven years general office and factory experience. Age 31, married, active, energetic and thoroughly capable. Correspondence solicited and references exchanged. Address PLUMBING MANAGER, care THE METAL INDUSTRY.

SITUATION WANTED—BRASS FOUNDRY SUPERINTENDENT or FOREMAN. Thoroughly experienced on ALUMINUM CASTINGS for automobiles, valve pump and general jobbing lines. Thirty-two years old, temperate and a hustler. Well up on molding machines and mixing metals. Address 0-2, care THE METAL INDUSTRY.

PROFESSIONAL

SITUATION WANTED—CHEMICAL ENGINEER of two years' experience wishes to communicate with a BRASS FOUNDRY desiring a college man who has both business and technical experience and who makes a specialty of Manganese Bronze and Aluminum. Address INGOT, care THE METAL INDUSTRY.

ROLLING MILL EXPERTS

SITUATION WANTED—By a BRASS and COPPER ROLLING MILL EXPERT. A few years ago I took charge of a rolling mill and in a short time they were compelled to work overtime to keep up with their orders. My experience with the company covered all departments of the rolling mill business from selling to making the material. I would like to correspond with a rolling mill that has an opening for such a man. Address METAL ROLLING MILL, care THE METAL INDUSTRY.

SITUATION WANTED—As ROD ROLLER in Brass Rod Mill. Have had charge of a rod mill for years. Can furnish the best of reference. Address ROD ROLLER, care THE METAL INDUSTRY.

PATTERN MAKER

SITUATION WANTED—FOREMAN METAL PATTERN MAKER experienced on steam specialties and plumbers' brass goods, also the manufacture of general brass goods. Address B, care THE METAL INDUSTRY.

FOUNDERS

SITUATION WANTED—First-class FOUNDRY FOREMAN wishes a position. Knows business from A to Z. First-class references. Jobbing, auto valves, and all classes of work in non-ferrous alloys. Address Z. Y. X., care THE METAL INDUSTRY.

SITUATION WANTED—By a first-class FOUNDRY FOREMAN; 30 years' experience on all classes of work, including plumbers' supplies, valves, automobile and jobbing. Can handle help to advantage. Also knows all saving devices for melting and molding and mixing metals from lead to gold. Address P. B. O., care THE METAL INDUSTRY.

SITUATION WANTED—Young man who is familiar with the manufacture of high tensile metals and alloys, desires a position. Address K., care THE METAL INDUSTRY.

SITUATION WANTED—By a BRASS FOUNDRY FOREMAN. Can do my own mixing, and can handle crucible or Schwartz furnaces. Can also control help, and molding machines to advantage in the manufacture of valves, cocks, fittings, etc. Address B. F., care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN CHANDELIER or ARCHITECTURAL BRONZE CONSTRUCTION. Factory or outside position. Capable of handling men to best advantage. Would also consider salesmanship with well established house. Address D. E., care THE METAL INDUSTRY.

SITUATION WANTED—By a PLASTER COMPOSITION FOUNDRYMAN with 9 years' experience at fine arts castings in metals, plaster, wax and glue; also for patterns for engraving machines. Address P. C. F., care THE METAL INDUSTRY.

SITUATION WANTED—By ALUMINUM FLOOR MOLDER thoroughly familiar with heavy and light work. Have had 19 years' experience. Address N. J., care THE METAL INDUSTRY.

STEAM AND ELECTRICAL ENGINEER

SITUATION WANTED—By a practical STEAM and ELECTRICAL ENGINEER, 2nd class N. Y. license; wishes steady employment. Holding a responsible position for the last 8 years with a large modern electrical plant. Good reference; capable of taking charge. Address T. S., care THE METAL INDUSTRY.

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ELECTROPLATERS

Any one desiring the services of first class men for the electro-deposition of metals and finishing in all branches and departments of the plating business can secure such services by corresponding with the Secretary of the National Electro-Platers' Association, Royal F. Clark, 246 Fulton Avenue, Jersey City, N. J.

SITUATION WANTED—By a PLATER, POLISHER and BUFFER. Sixteen years' experience. Have had charge of plant and can give first-class references as to ability and work. Have also installed plating plant. Make a specialty of Nickel, Brass, Bronze, Copper, Oxidizing and Coloring; can make and take care of galvanizing solution. Would like to correspond with a firm who desires such a man. Would prefer to locate in Indiana. Address INDIANA, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER of wide experience. Thorough knowledge of the latest bright finishes on all kinds of metals—Bright, Copper, Bright Nickel, Bright Silver and Bright Brass. Latest methods of handling help to the best advantage. Address BRIGHT FINISHES, care THE METAL INDUSTRY.

SITUATION WANTED—EXPERT PLATER on all finishes from gold to brass desires a steady position. Am steady, temperate and capable of taking charge. Novelties my specialty, but make no choice. Can make all solutions. Have 12 years' experience on all metals. Can install plating room. In answering please give full particulars. Address PLATER, care Cohen, 283 Grand street, New York.

SITUATION WANTED—PLATER, BUFFER and POLISHER, now working, desires position in the East where mental effort and ability would be tolerated. Plates in copper, brass, bronze, nickel, silver, gold platinum, zinc and tin. Makes all chandelier, hardware and art metal finishes. Can install economic and efficient system. Address EXPERT PLATER, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER with several years' experience on Nickel, Brass, Copper, Bronze Solutions, oxidizing and dipping. Address J-23, care THE METAL INDUSTRY.

SITUATION WANTED—By a GILDER EXPERT on shades of GOLD COLORING. Age 35. Position in Newark or New York City preferred. Address JEWELRY, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER. First-class man on nickel, brass, copper, silver, black nickel; understands all hardware finishes, etc. Address N-2, care THE METAL INDUSTRY.

SITUATION WANTED—By a FOREMAN PLATER who is up to date on all finishes and colors. Desires a position with a good firm. Salary $30 per week. Address D-1, care THE METAL INDUSTRY.

SITUATION WANTED—By a FOREMAN PLATER who thoroughly understands the plating business from A to Z. Has had several years' experience and is capable of taking charge. Address P. H., care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER having had ten years' experience on all metals and finishes. Can furnish best of reference. Address CONNECTICUT, care THE METAL INDUSTRY.

SITUATION WANTED—By an ELECTRO-PLATER, 18 years' experience with Nickel, Copper, Brass and Bronze solutions and oxidizing. Can furnish good reference. Address BOX M-9, care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN PLATER, POLISHER and BUFFER with a wide experience, now employed, would make a change. Steady position desired. Address H. G. S., care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN PLATER desires position. Can handle all solutions, but have made a specialty of Brass, Nickel and Copper, also Acid Copper on Iron. No plant too large. Familiar with Barrel Plating. Highest references. Address G. C. T., care THE METAL INDUSTRY.

BOOKS ON PLATING

BOOKS ON METALS

BOOKS ON MACHINERY

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See Page 49.

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A resumé of the operations involved in the manufacture of the various brass founders' alloy, with some carefully chosen tables of mixtures in present use.

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PRACTICAL METAL TURNING. Joseph G. Horner. 5½ x 8 inches; 404 pages; illustrated.... 3.50 4.00

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PRESS WORKING OF METALS. Oberlin Smith 5¼ x 8¾ inches; 262 pages; 433 illustrations... 3.00 3.50

A treatise upon the principles and practice of shaping metals in dies by the action of presses, together with a description of the construction of such implements in their various forms and of the materials worked in them.

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This is practically an encyclopedia of die and punch making, sheet metal working, and the making of special machines of the metal press type. The author covers the subject in the most practical manner.

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Practical platers consider this one of the best hand books on plating, particularly for young men. It explains the subject clearly and plainly from the management of batteries and dynamos to methods of using lacquers.

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A treatise covering the production of every shade of color which can be produced on metals. Discussed under, 1, chemical metal-coloring; 2, electro-chemical metal-coloring; 3, mechanical metal-coloring.

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Grasselli Chemical Co., Cleveland, O.
Niagara Alkali Co., Niagara Falls, N. Y.

Acid, Sulphuric (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Grasselli Chemical Co., Cleveland O.
Illinois Zinc Co., Peru, Ill.
Kalbfleisch, Franklin H., Co., New York.
Matthiesen & Hegeler Zinc Co., La Salle, Ill.
McKesson & Robbins, New York.

Air Compressors.
Eclipse Air Brush & Compressor Co., Bloomfield, N. J.
Eureka Pneumatic Spray Co., New York.
Leiman Bros., New York.
Nicholls, W. H., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.

Air Filters.
Eclipse Air Brush & Compressor Co., Bloomfield, N. J.
Eureka Pneumatic Spray Co., New York.

Alloys Made to Specifications.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Birkenstein, S., & Sons, Chicago, Ill.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Fitz, Dana & Co., Boston, Mass.
Genessee Metal Co., Rochester, N. Y.
Lang, R. F., New York.
Leavitt, C. W., & Co., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Alloys, Spark Emitting.
Treibacher Chemical Co., New York.

Aluminum Bronze Ingots.
Electric Smelting & Alum'n Co., Lockport, N. Y.

Aluminum Castings.
Aluminum Company of America, Pittsburg, Pa.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Atkinson Co., The, Rochester, N. Y.
Light Foundry & Mfg. Co., Pottstown, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.

Aluminum Electrical Conductors.
Aluminum Company of America, Pittsburg, Pa.

Aluminum, Granulated
U. S. Reduction Co., Chicago, Ill.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Aluminum Ingots.
Aluminum Company of America, Pittsburg, Pa.
American Smelting & Refining Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Kemp, W. H., Co., New York.
Leavitt, C. W., & Co., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
United Aluminum Ingot Co., New York.
U. S. Reduction Co., Chicago, Ill.

Aluminum Match Plates.
McPhee, Hugh, Tarrytown, N. Y.

Aluminum Powder, Leaf and Foil.
Kemp, W. H., Co., New York.

Aluminum Manufactured Goods, Sheet
(See also Metal Goods made to order.)
Aluminum Goods Mfg. Co., Manitowoc, Wis.

Aluminum Moldings and Extruded Shapes.
Aluminum Co. of America, Pittsburg, Pa.

Aluminum Rivets.
Hassall, John, Inc., Brooklyn, N. Y.
Kemp, W. H., Co., New York.

Aluminum Sheets, Rods and Wire.
Aluminum Company of America, Pittsburg, Pa.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Kemp, W. H., Co., New York.
Pilling Brass Co., Waterbury, Conn.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Aluminum Solder (See Solder.)

Aluminum Tubes.
Aluminum Company of America, Pittsburg, Pa.
Ellwood Ivins Tube Works, Philadelphia, Pa.
Kemp, W. H., Co., New York.

Ammeters and Voltmeters (See also Platers' Supplies).
Bristol Co., The, Waterbury, Conn.
Sangamo Electric Co., Springfield, Ill.

Amyl Acetate (See also Platers' Supplies).
Anderson Chemical Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
McKesson & Robbins, New York.
Nikolas, G. J., & Co., Chicago, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Annealing Machines, Automatic
Hartley, Spalckhaven & Fay, New York.

Anodes, Brass or Copper (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Hanson & Van Winkle Co., Newark, N. J.
Hussey, C. G., & Co., Pittsburg, Pa.
Munning-Loeb Co., Matawan, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Anodes, Nickel (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Detroit Foundry Supply Co., Detroit, Mich.
Hanson & Van Winkle Co., Newark, N. J.
McKesson & Robbins, New York.
Munning-Loeb Co., Matawan, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Anodes, Platinum (See also Platers' Supplies).

Anodes, Silver (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Jackson, John J., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.

Anodes, Zinc (See also Platers' Supplies).
Grasselli Chemical Co., Cleveland, O.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Antimony Metal.
American Smelting & Refining Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
U. S. Reduction Co., Chicago, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Assayers (See Chemists and Assayers).

Automatic Cock Grinder.
Turner Machine Co., Philadelphia, Pa.

Automatic Drop Lifters.
Peck Drop Press Works, New Haven, Conn.

Babbitt Metals.
American Manganese Bronze Co., New York.
American Smelting & Refining Co., Cincinnati, O.
Atkinson Co., The, Rochester, N. Y.
Benson, H. K. & F. S., Glen Ridge, N. J.
Birkenstein, S., & Sons, Chicago, Ill.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Fitz, Dana & Co., Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.

Balls, Steel, for Burnishing
Abbott Ball Co., Hartford, Conn.
Globe Machine & Stamping Co., Cleveland, O.

Bassite.
Bassite Smelting & Mfg. Co., Cincinnati, O.

Bismuth.
Fitz, Dana & Co., Boston, Mass.
Hendricks Brothers, New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.

Block Tin (See Tin).

Block Tin Pipe.
North American Smelting Co., Philadelphia, Pa.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Blow Piping for Dust Collectors, Etc.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Knickerbocker Company, Jackson, Mich.
Leiman Bros., New York.

Brass and Bronze Architectural Work.
Manhattan Brass Co., New York.

Brass and Bronze Covered Iron Tubes.
Phenix Tube Co., Brooklyn, N. Y.

Brass Castings.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.
Buermann Mfg. Co., August, Newark, N. J.
Damascus Bronze Co., Pittsburg, Pa.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Sargeant Mfg. Co., Newark, N. J.

Brass Ingots.
American Manganese Bronze Co., New York.
American Smelting & Refining Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Damascus Bronze Co., Pittsburg, Pa.
Genessee Metal Co., Rochester, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'f'd Copper Co., New Bedford, Mass.
Whipple & Choate, Bridgeport, Conn.
White & Bro., Inc., Philadelphia, Pa.

Brass, Bronze, Copper and Oreide Sheet, Wire, Rod, Etc.
American Manganese Bronze Co., New York.
Ansonia Brass & Copper Co., The, New York.
Benson, H. K. & F. S., Glen Ridge, N. J.
Bridgeport Brass Co., Bridgeport, Conn.
Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Hendricks Bros., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Manhattan Brass Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Copper & Brass Co., Detroit, Mich.
Pilling Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Brass, Bronze, Copper and Oreide Tubes.
Ansonia Brass & Copper Co., The, New York.
Bridgeport Brass & Copper Co., The, New York.
Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y.
Ellwood Ivins Tube Works, Philadelphia, Pa.
Manhattan Brass Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Copper & Brass Co., Detroit, Mich.
Phenix Tube Co., Brooklyn, N. Y.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Waterbury Brass Co., Waterbury, Conn.
Wells, A. H., Co., Waterbury, Conn.

Brass Goods, Plumbers'
Manhattan Brass Co., New York.

Brazing—Brass, Iron, Etc.
Morgan Manufacturing Co., Newport, R. I.

Britannia Metal.
Benson, H. K. & F. S., Glen Ridge, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Ansonia Brass & Copper Co., The, New York.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburgh, Pa.
Fitz, Dana & Co., Boston, Mass.
Genesee Metal Co., Rochester, N. Y.
Lang, R. F., New York.
Naulty Smelting & Ref'g Co., Philadelphia, Pa.
North American Smelting Co., Philadelphia, Pa.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'f'd Copper Co., New Bedford, Conn.

Bronze Sheets, Wire, Rods, Etc. (See Brass, Bronze and Copper Sheets, etc.).

Bronze Tubes (See Brass, Bronze and Copper Tubes).

Brushes, Wire and Bristle (See also Foundry Supplies and Platers' Supplies).
Blumenthal, Hermann, New York.
Kelly, T. P., & Co., New York.
Manufacturers' Brush Co., Cleveland, O.
Osborn Manufacturing Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Riehl Manufacturing Co., Cleveland, O.

Buckle Tongues.
Campbell-Warner Co., Middletown, Conn.

Buffing Compositions (See also Platers' Supplies).
American Tripoli Co., Seneca, Mo.
Emery Candle Co., Cincinnati, O.

Buffing and Polishing Supplies (See Polishing and Buffing Machinery and Equipment).

Buffing and Polishing Wheels (See also Platers' Supplies).
Bacon Felt Co., Winchester, Mass.
Divine Brothers Co., Utica, N. Y.

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Bull-Dozers
Wood, R. D., & Co., Philadelphia, Pa.

Burners, Fuel Oil or Gas (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Fisher, Alfred, Chicago, Ill.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Jersey City, N. J.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Burnishing Barrels (See also Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Oakville, Conn.
Globe Machine & Stamping Co., Cleveland, O.
Smith & Richardson, Attleboro, Mass.
Tolhurst Machine Works, Troy, N. Y.

Burnishing Barrels, Leather Meal for
Peckham Mfg. Co., Newark, N. J.

Burnishing Compounds and Chips (See also Platers' and Polishers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Emery Candle Co., Cincinnati, O.
Haas Bros. Supply Co., Newark, N. J.
Harral Chemical Co., New York.
International Chemical Co., Camden, N. J.
Stevens, Frederic B., Detroit, Mich.

Cabbaging Presses.
Farrel Foundry & Machine Co., Ansonia, Conn.
Wood, R. D., & Co., Philadelphia, Pa.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.

Cadmium, Metallic
Gresselli Chemical Co., Cleveland, O.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Richards & Co., Boston, Mass.

Carboy Rockers.
Rockhill & Vietor, New York.

Castings. (See also name of metal wanted).

Castings, Iron Machinery
Bliss Co., E. W., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Wood, R. D., & Co., Philadelphia, Pa.

Caustic Potash (See Platers', Polishers' and Galvanizers' Supplies.

Centrifugal Dryers and Extractors
American Tool & Machine Co., Boston, Mass.
Tolhurst Machine Works, Troy, N. Y.

Chaplets, Perforated (See Foundry Supplies).

Chemicals (See Platers' Supplies).

Chromium Bronze.
Naulty Smelting & Refining Co., Philadelphia, Pa.

Chucks.
American Tool & Machine Co., Boston, Mass.

Chucks, Spinning
Bliss, E. W., Co., Brooklyn, N. Y.
Pryibil, P., New York.

Cock Grinder, Automatic
Turner Machine Co., Philadelphia, Pa.

Composition Metal Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Buermann Mfg. Co., August, Newark, N. J.
Damascus Bronze Co., Pittsburgh, Pa.
Eastern Metal & Refining Co., Boston, Mass.
Fitz, Dana & Co., Boston, Mass.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
White & Bro., Inc., Philadelphia, Pa.

Composition Metal Tacks, Nails, Etc.
Hussey, C. G., & Co., Pittsburg, Pa.

Conveyors.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.

Copper, Carbonate of
Apothecaries Hall Co., Waterbury, Conn.
Detroit Foundry Supply Co., Detroit, Mich.
Wiarda & Co., John C., Brooklyn, N. Y.

Copper Castings.
American Manganese Bronze Co., New York.
Reeves, Paul S., & Son, Philadelphia, Pa.

Copper Ingots.
American Smelting & Refining Co., Cincinnati, O.
Balbach Smelting & Refining Co., Newark, N. J.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Hendricks Brothers, New York.
Lang, R. F., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Taunton-New B'f'd Copper Co., New Bedford, Mass.
White & Bro., Inc., Philadelphia, Pa.

Copper Nails and Tacks.
Hassall, John, Inc., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Scovill Manufacturing Co., Waterbury, Conn.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Copper Rivets.
Hassall, John, Inc., New York.
Hendricks Bros., New York.

Copper Sheets, Wire, Rods, Bolts, Etc. (See Brass, Bronze and Copper Sheets, etc.)

Copper, Shot
Seymour Manufacturing Co., Seymour, Conn.

Copper, Sulphate of
Apothecaries Hall Co., Waterbury, Conn.
Grasselli Chemical Co., Cleveland, O.

Copper Tubes (See Brass and Copper Tubes).

Core Compound (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Kelly, T. P., & Co., New York.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Core Machines and Core Tapering Machines (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Nicholls, W. H., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.

Core Ovens (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Gehnrich, Hermann, New York.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Smith, J. D., Foundry & Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Coslettizing.
Flavell, E. A., New Britain, Conn.

Cranes.
Detroit Foundry Supply Co., Detroit, Mich.

Crucibles, Stirrers, Stoppers, Nozzles, Etc. (See also Foundry Supplies).
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Gautier, J. H., & Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Paige Retort & Crucible Co., Taunton, Mass.
Ross-Tacomy Crucible Co., Philadelphia, Pa.
Taylor, R. J., Inc., Philadelphia, Pa.

Crushers, Cinder (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Farrel Foundry & Machine Co., Ansonia, Conn.
Moussette, O. J., Co., Brooklyn, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Cyanide of Potassium (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
McKesson & Robbins, New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Die Castings.
Finished Parts Mfg. Co., Newark, N. J.

Dies, Sheet Metal Working
Baird Machine Co., Oakville, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Globe Machine Stamping Co., Cleveland, O.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Draw Benches—Wire, Rod and Tube
Farrel Foundry & Machine Co., Ansonia, Conn.
Leiman Bros., New York.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Torrington Mfg. Co., Torrington, Mass.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Drosses (See Metal Turnings, Drosses, etc.).

Drying-Out Machines.
Baird Machine Co., Oakville, Conn.
Smith & Richardson, Attleboro, Mass.
Tolhurst Machine Works, Troy, N. Y.
Torrington Mfg. Co., Torrington, Mass.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Dust Collectors and Ventilating Systems.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Kirk & Blum, Cincinnati, O.
Knickerbocker Co., The, Jackson, Mich.
Leiman Bros., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.

Dynamos, Platers' and Galvanizers' (See also Platers' Supplies).
Backus & Leeser Co., New York.
Bennett-O'Connell Co., Chicago, Ill.
Bogue, Chas. J., Electric Co., New York.
Canning, W. Co., Birmingham, England.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Hanson & Van Winkle Co., Newark, N. J.
Leiman Bros., New York.
L'Hommedieu, C. F., & Sons, Chicago, Ill.
Munning-Loeb Co., Matawan, N. J.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Stevens, Frederic B., Detroit, Mich.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Elaine (Red Oil).
Emery Candle Co., Cincinnati, O.

Electric Cleaning Compounds (See Metal Cleaning Compounds).

Electroplaters' Centrifugal Dryers
Tolhurst Machine Works, Troy, N. Y.

Electroplating, Polishing, Coloring, Etc.
Electro Bronze Co., Arlington, N. J.
Northern Ohio Mfg. & Refg. Works, Cleveland, O.
Rojas Electro-Chemical Co., New York.
Sargeant Mfg. Co., Newark, N. J.

Emery (See Platers' Supplies).

Emery Wheels (See Grinding Machinery, etc.).

Enameling Ovens.
Gehnrich, Herrmann, New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Engineers, Mechanical, Foundry, Etc.
Pangborn, Thomas W., Co., Jersey City, N. J.
Smith, J. D., Foundry Supply Co., Cleveland, O.

Escutcheon Pins, All Metals
Hassall, John, New York.

Etched Name Plates.
Schweizer, Max., Bridgeport, Conn.

Exhaust Fans.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Lederer, F. J., Co., Buffalo, N. Y.
Leiman Bros., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.

Expert Instruction—Plating, Coloring, Dipping, Etching, Etc.
Rojas Electro-Chemical Co., New York.
Schweizer, Max, Bridgeport, Conn.

Extractors, Centrifugal Drying
American Tool & Machine Co., Boston, Mass.
Tolhurst Machine Works, Troy, N. Y.

Fig Cleanser.
Emery Candle Co., Cincinnati, O.
Haas Bros. Supply Co., Newark, N. J.
Harral Chemical Co., New York.
International Chemical Co., Camden, N. J.

Fire Brick (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Stevens, Frederic B., Detroit, Mich.

Flasks, Brass Molders' (See also Foundry Supplies).
McPhee, Hugh, Tarrytown, N. Y.
Middleditch, Benj., Detroit, Mich.
Nicholls, W. H., New York.
Osborn Mfg. Co., Cleveland, O.
Sterling Wheelbarrow Co., West Allis, Wis.
Stevens, Frederic B., Detroit, Mich.

Fluxes, Metal (See also Foundry Supplies).
Bassite Smelting & Mfg. Co., Cincinnati, O.
Reeves, Paul S., & Son., Philadelphia, Pa.
Uraniumite Co. of America, Buffalo, N. Y.

Fluxes, Soldering and Tinning
Grasselli Chemical Co., Cleveland, O.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.

Forgings, Automobile
American Manganese Bronze Co., New York.
Bliss, E. W., Co., Brooklyn, N. Y.
Phosphor Bronze Smelting Co., Philadelphia, Pa.

Foundry Facings (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Kelly, T. P., & Co., New York.
McKesson & Robbins, New York.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Foundry Supplies and Equipment.
Bassite Smelting & Mfg. Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Kelly, T. P., & Co., New York.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Furnace Linings (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Kroeschell Bros. Co., Chicago, Ill.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Stevens, Frederic B., Detroit, Mich.

Furnaces, Annealing, Brazing, Etc.
Chicago Flexible Shaft Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Fisher, Alfred, Chicago, Ill.
Hartley, Spalckhaver & Fay, New York.
Monarch Eng. Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Furnaces, Electric
Bristol Co., The, Waterbury, Conn.

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Rockwell, W. S., Co., New York.

Furnaces, Melting, for Oil, Coal, Coke, or Gas. (See also Foundry Supplies).
Chicago Flexible Shaft Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Fisher, Alfred, Chicago, Ill.
Ideal Furnace Co., Chester, Pa.
Kroeschell Bros. Co., Chicago, Ill.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Stevens, Frederic B., Detroit, Mich.

Furnaces, Reverberatory
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Fuael Oil, Refined (See also Platers' Supplies).
Anderson Chemical Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
McKesson & Robbins, New York.
Nikolas, G. J., & Co., Chicago, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Galvanized Specialties, Nails, Screws, Etc.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing Plants and Equipment. (See also Platers' and Polishers' Supplies).
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing Barrels and Automatic Devices.
Globe Machine & Stamping Co., Cleveland, O.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing for the Trade.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Gas Producers and Power Plants
Wood, R. D., & Co., Philadelphia, Pa.

German Silver Ingots, Castings, Etc.
Buermann Mfg. Co., August, Newark, N. J.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

German Silver Sheets, Wire, Rods, Tubes, Etc.
Michigan Copper & Brass Co., Detroit, Mich.
Pilling Brass Co., Waterbury, Conn.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co.o, The, Seymour, Conn.
Waterbury Brass Co., Waterbury, Conn.

Gold Alloys.
Riverside Metal Co., Riverside, N. J.

Gold Ingots, Bars, Plates, Etc.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Graphite (See Foundry Supplies).

Grinding Machinery.
Bennett-O'Connell Co., Chicago, Ill.
Blake & Johnson Co., Waterbury, Conn.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Osborn Mfg. Co., Cleveland, O.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Webster & Perks Tool Co., Springfield, O.

Grinding Wheels (See Foundry Supplies).

Heat Gages.
Bristol Co., Waterbury, Conn.

Hoists, Electric, Pneumatic, Hand
Detroit Foundry Supply Co., Detroit, Mich.

Hydraulic Accumulators.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Hydraulic Machinery, Presses, Jacks, Etc.
Farrel Foundry & Machine Co., Ansinia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Iron, Scrap, Dealers in
Smith Co., The Morton B., New York.

Iron Tubes, Brass and Bronze Covered
Phenix Tube Co., Brooklyn, N. Y.

Japanning Ovens.
Gehnrich, Hermann, New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Japans.
Apothecaries Hall Co., Waterbury, Conn.

Jewelers' Equipment and Supplies (See also Platers' Supplies).
Leiman Bros., New York.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Tolhurst Machine Works, Troy, N. Y.

Jewelers' Findings.
Smith & Richardson, Attleboro, Mass.

Kettles, Galvanizing and Tinning (See also Platers' Supplies).
Farrel Foundry & Machine Co., Ansonia, Conn.

Lacquer Enamels. (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Munning-Loeb Co., Matawan, N. J.
Eureka Pneumatic Spray Co., New York.
Hanson & Van Winkle Co., Newark, N. J.

Lacquering Ovens.
Gehnrich, Hermann, New York.
Steiner, E. E., Newark, N. J.

Lacquer Sprayers.
Eclipse Air Brush & Compressor Co., Bloomfield, N. J.
Eureka Pneumatic Spray Co., New York.
Lederer, F. J., Co., Buffalo, N. Y.
Paasche Air Brush Co., Chicago, Ill.

Lacquers, Metal (See also Platers' Supplies).
American Lacquer Co., Bridgeport, Conn.
Anderson Chemical Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
Celluloid Zapon Co., New York.
Chemical Products Co., Boston, Mass.
Egyptian Lacquer Manufacturing Co., New York.
Eureka Pneumatic Spray Co., New York.
General Bakelite Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Kalbfleisch, Franklin H., Co., New York.
Munning-Loeb Co., Matawan, N. J.
New Era Lustre Co., New Haven, Conn.
Nikolas, G. J., & Co., Chicago, Ill.

Ladle Heaters and Dryers (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.

Ladles (See also Foundry Supplies.
Detroit Foundry Supply Co., Detroit, Mich.

Lathes, Polishing (See Platers' and Polishers' Supplies).

Lathes, Spinning, Turning, Etc.
American Tool & Machine Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N. Y.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Pryibil, P., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Lathes, Turret
American Tool & Machine Co., Boston, Mass.

Lead, Antimonial
Leavitt, C. W., & Co., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Lead Castings, Antimonial
Electro Bronze Co., Arlington, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Leaden Ware and Lead Burning.
Wiarda & Co., John C., Brooklyn, N. Y.

Lead, Pig and Bar
American Smelting & Refining Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Chadwick-Boston Lead Co., Boston, Mass.
Fitz, Dana & Co., Boston, Mass.
Hendricks Bros., New York.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
U. S. Reduction Co., Chicago, Ill.

Lead Pipe.
North American Smelting Co., Philadelphia, Pa.

Leather Meal for Dry Tumbling.
Peckham Mfg. Co., Newark, N. J.

Lubricants.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

Lycopodium (See also Foundry Supplies.
Apothecaries Hall Co., Waterbury, Conn.
McKesson & Robbins, New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Magnesium Metal.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Roessler & Hasslacher Chemical Co., New York.

Magnetic Metal Separators (See also Foundry Supplies).
American Concentrator Co., Joplin, Mo.
Capitol Brass Works, Detroit, Mich.
Dings Electro-Mag .Separator Co., Milwaukee, Wis.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.

Manganese Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelting & Refining Co., Detroit, Mich.
Lang, R. F., New York.
Fitz, Dana & Co., Boston, Mass.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Manganese Bronze Sheets, Rods, Etc.
American Manganese Bronze Co., New York.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Manganese Copper.
American Smelting & Refining Co., Cincinnati, O.
Electric Smelting & Alum. Co., Lockport, N. Y.
Lang, R. F., New York.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Roessler & Hasslacher Chemical Co., New York.

Manganese Metal.
Leavitt, C. W., & Co., New York.
Reeves, Paul S., & Sons, Philadelphia, Pa.
Roessler & Hasslacher Chemical Co., New York.

Match Plates
McPhee, Hugh, Tarrytown, N. Y.
Middleditch, Benj., Detroit, Mich.

Metals (See name of metal wanted).

Metal Cleaning Compounds (See also Platers' Supplies).
Anthony, H. M., & Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Emery Candle Co., Cincinnati, O.
Hanson & Van Winkle Co., Newark, N. J.
Harral Chemical Co., New York.
Haas Bros. Supply Co., Newark, N. J.
International Chemical Co., Camden, N. J.
Munning-Loeb Co., Matawan, N. J.
Standard Supply Co., New Haven, Conn.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Metal Fluxes (See also Foundry Supplies).
Bassite Smelting & Mfg. Co., Cincinnati, O.
Reeves, Paul S., & Son, Philadelphia, Pa.
Uraniumite Co. of America, Buffalo, N. Y.

Metallurgists, Consulting.
Detroit Testing Laboratory, Detroit, Mich.
Krom, L. J., New York.
Ledoux & Co., New York.

Metals, Dealers in all Kinds of New (See also name of metal wanted).
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Moers, Albert A., New York.
Richards & Co., Boston, Mass.

Metals, Dealers in Old
Birkenstein, S., & Sons, Chicago, Ill.
Genesee Metal Co., Rochester, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Smith, The Morton B. Co., New York.
Riverside Metal Co., Riverside, N. J.

Metals, Dealers in Old—Gold, Silver, Platinum
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Goods Drying Machines
Tolhurst Machine Works, Troy, N. Y.

Metal Goods Made to Order.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Ansonia Brass & Copper Co., New York.
Bridgeport Brass Co., Bridgeport, Conn.
Buermann Mfg. Co., August, Newark, N. J.
Electro Bronze Co., Arlington, N. J.
Manhattan Brass Co., New York.
Riverside Metal Co., Riverside, N. J.
Sargeant Mfg. Co., Newark, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Waterbury Brass Co., Waterbury, Conn.

Metal, Plated Sheet
Benson, H. K. & F. S., Glen Ridge, N. J.
National Sheet Metal Co., Peru, Ill.

Metal Refiners, Gold and Silver.
Genesee Metal Co., Rochester, N. Y.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Refiners—White Metal.
Birkenstein, S., & Sons, Chicago, Ill.
Michigan Smelting & Refining Co., Detroit, Mich.
Reeves, Paul S .,& Sons, Philadelphia, Pa.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Metal, Silver Plated Sheet
Benson, H. K. & F. S., Glen Ridge, N. J.

Metal Spinning. (See also Metal Goods made to order).
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Metal Stamping. (See also Metal Goods made to order).
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Globe Machine & Stamping Co., Cleveland, O.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

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Birkenstein, S., & Sons, Chicago, Ill.
Illinois Smelting & Refining Co., Chicago, Ill.
Smith, The Morton B., Co., New York.
Whipple & Choate, Bridgeport, Conn.
White & Bro., Inc., Philadelphia, Pa.

Mold Dryers, Portable (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.

Mold Spraying Machines. (See also Foundry Supplies).
Pangborn, Thomas W., Co., Jersey City, N. J.

Molds, Ingot (See also Foundry Supplies.
Farrel Foundry & Machine Co., Ansonia, Conn.
Nicholls, Wm. H., New York.
Paxson, J. W., Co., Philadelphia, Pa.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Molding Machines. (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Kelly, T. P., & Co., New York.
McPhee, Hugh, Tarrytown, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Turner Machine Co., Philadelphia, Pa.

Monel Metal Sheets.
Merchant & Evans Co., Philadelphia, Pa.

Muntz's Metal—Sheets, Rods, Bolts, Nails, Etc.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Nails. (See name of metal wanted).

Name Plates, Etched
Schweizer, Max, Bridgeport, Conn.

Nickel.
Hanson & Van Winkle Co., Newark, N. J.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Munning-Loeb Co., Matawan, N. J.
Richards & Co., Boston, Mass.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel-Bronze Castings and Ingots.
Damascus Bronze Co., Pittsburgh, Pa.

Nickel Castings.
Hanson & Van Winkle Co., Newark, N. J.
Munning-Loeb Co., Matawan, N. J.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel Salts. (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Detroit Foundry Supply Co., Detroit, Mich.
Hanson & Van Winkle Co., Newark, N. J.
McKesson & Robbins, New York.
Munning-Loeb Co., Matawan, N. J.
Stevens, Frederic B., Detroit, Mich.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel, Shot
Merchant & Evans Co., Philadelphia, Pa.
Seymour Manufacturing Co., The, Seymour, Conn.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel Silver Tubes.
Wells, A. H., & Co., Waterbury, Conn.

Oil Pumps and Storage Tanks.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Oil Separators.
American Tool & Machine Co., Boston, Mass.

Oils, Tempering and Lubricating
Apothecaries Hall Co., Waterbury, Conn.
McKesson & Robbins, New York.
Swan & Finch, New York.

Ovens. (See also Core, Lacquering, Enameling and Sherardizing Ovens).
Gehnrich, Hermann, New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Steiner, E. E., Newark, N. J.

Parting Compounds. (See also Foundry Supplies
Apothecaries Hall Co., Waterbury, Conn.
Detroit Foundry Supply Co., Detroit, Mich.
Kelly, T. P., & Co., New York.
Stevens, Frederic B., Detroit, Mich.

Patterns, Mounted
McPhee, Hugh, Tarrytown, N. Y.

Pattern Shop Supplies (See Foundry Supplies).

Pewter.
Standard Rolling Mills Inc., Brookyn, N. Y.

Phosphor Bronze Ingots, Castings, Etc.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburgh, Pa.
Illinois Smelting & Refining Co., Chicago, Ill.
Lang, R. F., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Mfg. Co., Seymour, Conn.

Phosphor Bronze Sheets, Wire, Rods, Etc.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Pilling Brass Co., Waterury, Conn.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Mfg. Co., Seymour, Conn.

Phosphor Copper and Phosphor Tin.
American Smelting & Refining Co., Cincinnati, O.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburgh, Pa.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Lang, R. F., New York.
Michagan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverdale, N. J.
Roessler & Hasslacher Chemical Co., New York.

Phosphorus. (See also Foundry Supplies).
General Chemical Co., Philadelphia, Pa.
McKesson & Robbins, New York.

Pickling Machines, Automatic
Torrington Manufacturing Co., Torrington, Conn.

Platers' Compound. (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Haas Bros. Supply Co., Newark, N. J.
Harral Chemical Co., New York.
International Chemical Co., Camden, N. J.
Standard Supply Co., New Haven, Conn.
Swan & Finch Co., New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Platers' Metal (See also Platers' Supplies).
Kemp, W. H., Co., New York.
Pilling Brass Co., Waterbury, Conn.

Platers', Polishers' and Galvanizers' Equipment and Supplies.
Abbott Ball Co., Hartford, Conn.
Ames Sword Co., Chicopee, Mass.
Anderson Chemical Co., New York.
Anthony, H. M., Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
Backus & Leeser Co., New York.
Bacon Felt Co., Winchester, Mass.
Baird Machine Co., Oakville, Conn.
Bennett-O'Connell Co., Chicago, Ill.
Bogue, Chas. J., Electric Co., New York.
Burns, E. Reed, Brooklyn, N. Y.
Canning, W., & Co., Birmingham, England.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Detroit Foundry Supply Co., Detroit, Mich.
Divine Bros. Co., Utica, N. Y.
Emery Candle Co., Cincinnati, O.
Globe Machine & Stamping Co., Cleveland, O.
Grasselli Chemical Co., Cleveand, O.
Haas Bros. Supply Co., Newark, N. J.
Hanson & Van Winkle Co., Newark, N. J.
Harral Chemical Co., New York.
International Chemical Co., Camden, N. J.
Klauder-Weldon Dy'g Mach. Co., Amsterdam, N. Y.
Leiman Bros., New York.
L'Homedieu, C. F., & Sons, Chicago, Ill.
Meaker Company, Chicago, Ill.
McKesson & Robbins, New York.
Munning-Loeb Co., Matawan, N. J.
Oliver, W. W., Mfg. Co.
Peckham Mfg. Co., Newark, N. J.
Platinum Metals Co., Brookyn, N. Y.
Roessler & Hasslacher Chemical Co., New York.
Rockhill & Vietor, New York.
Rojas Chemical Co., New York.
Roth Bros. Co., Chicago, Ill.
Smith & Richardson, Attleboro, Mass.
Standard Supply Co., New Haven, Conn.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.
Tolhurst Machine Works, Troy, N. Y.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Webster & Perks Tool Co., Springfield, O.
Wiarda & Co., John C., Brooklyn, N. Y.

Plating Barrels and Apparatus. (See also Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Backus & Leeser Co., New York.
Baird Machine Co., Oakville, Conn.
Bennett-O'Connell Co., Chicago, Ill.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Detroit Foupndry Supply Co., Detroit, Mich.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, C. F., & Sons Co., Chicago, Ill.
Klauder-Weldon Dy'g Mach. Co., Amsterdam, N. Y
Munning-Loeb Co., Matawan, N. J.
Rockhill & Vietor, New York.
Smith & Richardson, Attleboro, Mass.
Stevens, Frederic B., Detroit, Mich.
Tolhurst Machine Works, Troy, N. Y.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Platinum Ingots.
Platinum Metals Co., Brooklyn, N. Y.

Platinum Salts and Solutions.
Platinum Metals Co., Brooklyn, N. Y.

Platinum Scrap, Buyers of
Platinum Metals Co., Brooklyn, N. Y.
Roessler & Hasslacher Co., New York.

Plumbago (See Graphite).

Polishing, Bulling and Burnishing Machinery and Appliances (See also Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Ames Sword Co., Chicopee, Mass.
Apothecaries Hall Co., Waterbury, Conn.
Backus & Lesser Co., New York.
Bacon Felt Co., Winchester, Mass.
Baird Machine Co., Oakville, Conn.
Bennett-O'Connell Co., Chicago, Ill.
Cleveland Blow Pipe Co., Cleveland, O.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Detroit Foundry Supply Co., Detroit, Mich.
Divine Bros. Co., Utica, N. Y.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Knickerbocker Co., Jackson, Mich.
Leiman Bros., New York.
L'Hommedieu, C. F., & Sons, Chicago, Ill.
Middleditch, Benj., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Osborn Mfg. Co., Cleveland, O.
Peckham Mfg. Co., Newark, N. J.
Pfieghar Hardware Sp'lty Co., New Haven, Conn.
Roth Bros., Chicago, Ill.
Stevens, Frederic B., Detroit, Mich.
Tolhurst Machine Works, Troy, N. Y.
Webster & Perks Tool Co., Springfield, O.

Polishing Belts, Endless (See also Platers' Supplies).
Ames Sword Co., Chicopee, Mass.
Divine Bros. Co., Utica, N. Y.

Polishing Meal for Dry Tumbling
Peckham Mfg. Co., Newark, N. J.

Potash. (See also Paters' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
International Chemical Co., Camden, N. J.
McKesson & Robbins, New York.
Niagara Alkali Co., Niagara Falls, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Presses, Bench and Foot
Baird Machine Co., Oakville, Conn.
Blake & Johnson Co., Waterury, Conn.
Bliss, E. W., Company, Brooklyn, N. Y.
Leiman Bros., New York.
Shuster, The F. B., Co., New Haven, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Presses, Cabbaging
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Wood, R. D., & Co., Philadelphia, Pa.

Presses, Coining
Bliss, E. W., Co., Brooklyn, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Presses, Drop
Bliss, E. W., Co., Brooklyn, N. Y.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Peck Drop Press Works, New Haven, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Presses, Drop Lifters for
Peck Drop Press Works, New Haven, Conn.

Presses, Filter.
American Tool & Machine Co., Boston, Mass.

Presses, Power
Baird Machine Co., Oakville, Conn.
Blake & Johnson Co., Waterbury, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Garrison, A., Foundry Co., Pittsburg, Pa.
Peck Drop Press Works, New Haven, Conn.
Torrington, Manufacturing Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Pressure Blowers (See also Foundry Supplies)
Eureka Pneumatic Spray Co., New York.
Lederer, F. J., Co., Buffalo, N. Y.
Leiman Bros., New York.
Monarch Eng. Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Pumice (See Platers', Polishers' and Galvanizers' Supplies).

Pyrometers.
Bristol & Co., The, Waterbury, Conn.

Riddles (See also Foundry Supplies).
Kelly, T. P., & Co., New York.
Stevens, Frederic B., Detroit, Mich.

Riveting Machines.
Shuster, The F. B., Co., New Haven, Conn.
Wood, R. D., & Co., Philadelphia, Pa.

Rivets—Brass, Aluminum, Etc.
Hassall, John, Inc., New York.
Hendricks Bros., New York.
Kemp, W. H., Co., New York.

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Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Rolls, Chilled and Sand
Blake & Johnson Co., Waterbury, Conn.
Farrel Foundry & Machine Co., Ansonia, Conn.
Garrison, A., Fdy. & Machine Co., Pittsburg, Pa.
Torrington Manufacturing Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Rolls, Jewelers'
Leiman Bros., New York.
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Dept. L NEW HAVEN, CONN.

BAKELITE LACQUER

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GENERAL BAKELITE COMPANY
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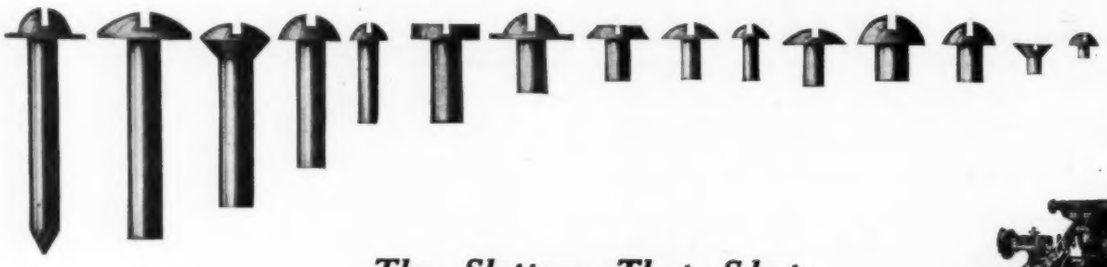
Some of the Product of the No. 1 Screw Slotting Machine



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With Speed and Accuracy
On Steel and Brass

TWO SIZES

Built by

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WATERBURY, CONNECTICUT, U. S. A

WESTERN OFFICE: 1012 Williamson Bldg., CLEVELAND, OHIO

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In the race for a full hand of Money there is always the possibility of a hand-full of Trouble.

Some of such possibility may be avoided by using my **Buffing Compositions.** They embody the qualities that some other Compositions lack, and they lack the frailties that mark some of the others.

The same law applies in other details: If you need a **Dynamo,** I have them in stock; if you order from a Manufacturer you wait three weeks—then, some. "Time is Money"—especially when you are waiting. I ship immediately.

The same is true of **Spanish Felt Wheels.** A large stock means a dry stock, and no moisture in weight. Mine are dry and are waiting your order.

Turkish Emery, the **Glue** to hold it in place until it wears out; **Italian Pumice,** American Ground and bolted, and the sundry other things necessary for a well managed Polishing and Plating Department are right here ready for quick shipment. The rest—well, that's up to you.

I MANUFACTURE FOUNDRY FACINGS, FOUNDRY SUPPLIES, BUFFING COMPOSITIONS AND PLATERS' SUPPLIES

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